

Bicentenary of Ludwig Leichhardt:

Contributions to Australia's Natural History
in honour of his scientific work exploring Australia

Edited by Barbara Baehr



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COVER: Montage of Leichhardt with *Opopaea ulrichi*, Leichhardt's *Hishimouus*, Leichhardt's *Hautenerus*, *Mysmeua leichhardti* sp. nov., *Coptoglossus leichhardti* sp. nov., *Denhamiana Leichhardti*, *Pseudotyranochthonius leichhardti* sp. nov., *Paradiscogaster leichhardti* sp. nov., *Kauekonia queenslandica*, *Leichhardtus coupalis*, *Leichhardtithrips evanidus*, *Denhamiana laetifica*, *Onthophagus leichhardti* sp. nov. Leichhardt's *Hautenerus* and far left *Marathonichthys coyleorum* gen. et sp. nov.
Design & layout by Sarah Verschoore

NOTE

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FOREWORD

(English translation follows)

Naturforscher in Australien 1813-1848(?)

Ich freue mich, dass mit diesem Buch an meinen Ur-Ur-Großonkel Ludwig Leichhardt erinnert wird. Hierdurch erhält sein Lebenswerk nicht nur einen festen Platz in den Lehrbüchern. Auch die Ideale und Werte, die ihn antrieben, werden dadurch geehrt – die bisweilen entbehrliche und gefährvolle Suche nach Wahrheit, exakter Wissenschaft und seine große Neugier auf Entdeckungen.

Auch in unserer Familie wurde immer wieder an unseren Vorfahren Ludwig Leichhardt erinnert. Von klein auf wuchs ich in dem Bewusstsein auf, dass er ein ganz besonderer Mensch gewesen ist. In der Schule stieß mich mein Erdkundelehrer auf meinen Verwandten, der die große weite Welt entdecken wollte und auf einem fernen Kontinent abenteuerliche Expeditionen durchführte. Die Eckdaten des Lebens Ludwig Leichhardts, und insbesondere das Rätsel um sein Verschwinden beschäftigten mich mein Leben lang: 1813 wurde mein Großonkel in Trebatsch geboren, einem kleinen Ort etwa 100 Kilometer südöstlich von Berlin. Nach Abitur und Studium verließ er Preußen. Er besuchte zunächst verschiedene europäische Länder. 1842 reiste er dann nach Australien. Dort leitete er verschiedene Expeditionen durch damals noch völlig unerforschte Territorien. Von seiner dritten Expedition, die im Jahr 1848 begann, kehrte er nicht wieder zurück. Bis heute liegen Verlauf und der Ausgang dieser letzten Expedition im Dunkeln. Für viele Menschen und auch für mich ist dies ein trauriges Faszinosum. Wie konnte es geschehen, dass Mitte des 19. Jahrhunderts eine ganze Expedition mit Lasttieren, Trägern, Instrumenten, Unterlagen und Forschern verschwinden konnte und bis heute keine Spuren dieser Expedition gefunden worden sind? Dieses traurige Faszinosum lässt die Lebensgeschichte von Ludwig Leichhardt als unvollendet erscheinen. Es erinnert mich insofern an Forschungen überhaupt, die zwar Fortschritte und Entdeckungen feiern, aber nie ein Ende nehmen. Und so ist es für mich auch nur konsequent, dass Ludwig Leichhardts Arbeit – seine unermüdliche Suche nach neuen Entdeckungen und das Überwinden von Widrigkeiten aller Art – von anderen Forschern fortgesetzt wird.

Ähnlich wie heutige Forscher kann ich natürlich nicht unmittelbar an das Leben von Ludwig Leichhardt anknüpfen. Doch habe ich mir die Aufgabe gestellt, immer wieder an ihn zu erinnern. Daher arbeite ich mit der Gesellschaft Ludwig Leichhardt zusammen, die sich der Pflege der Erinnerung an meinen Großonkel gewidmet hat. Sie unterhält beispielsweise ein kleines Museum in Trebatsch. Ich nehme an Veranstaltungen teil, wie den Feiern zum 200. Geburtstag meines Großonkels. Im Laufe meines Lebens war ich auch in Australien: Ich muss gestehen, dass ich nicht mit einer Expedition 'in den Busch' gezogen bin, um nach meinem Großonkel zu suchen oder seinen damaligen Weg nachzuvollziehen. Stattdessen habe ich mich auch dort an Seminaren beteiligt und von meiner Heimat erzählt, die ja auch die Heimat Ludwig Leichhardts war. Ich habe von den hier statt findenden Forschungsarbeiten zum Leben meines Großonkels berichtet und von der hiesigen Erinnerungskultur. Viele Teilnehmer an den Veranstaltungen und Seminaren haben mir berichtet, dass meine Beiträge diesen Veranstaltungen einen gewissen Hauch "des Originalen, des Authentischen" gaben, fast so, als würde der Geist Ludwig Leichhardts präsent sein. Ich bin froh darüber, dass ich auf diese Art an der Erinnerung an meinen Großonkel mitwirken kann.

Bis heute bewundere ich meinen Großonkel für den Mut, aus einer obrigkeitsstaatlichen Gesellschaft mit all ihrem Druck, ihren Versprechungen und Gewohnheiten auszubrechen und sich auf den Weg zu machen zu einem fremden Kontinent. Natürlich kann ich nicht für mich in Anspruch nehmen, in aller Tiefe zu ermessen, wie es für einen Menschen Mitte des 19. Jahrhunderts gewesen ist, seine Heimat zu verlassen und eine völlig unbekannte Welt zu erkunden. Jedoch habe ich aus erhaltenen schriftlichen Zeugnissen Ludwig Leichhardts von

seinem Forscherdrang und den Schwierigkeiten seiner Arbeit erfahren. Sein Bruch mit den damaligen Konventionen war voller Mühen: Geldgeber waren zu überzeugen, um die Expeditionen zu finanzieren, die Natur Australiens erwies sich als zum Teil überaus feindlich und an vielen Stellen mussten die Teilnehmer der Expedition überredet werden, in eine bestimmte Richtung weiterzuziehen. Ein Entdecker zu sein hatte offensichtlich seinen Preis. Ich kann es mir nicht anders vorstellen, als dass nur ein Mensch mit einem starken Charakter und mit Durchsetzungswillen diesen Preis zahlen konnte. Durch die überlieferten schriftlichen Zeugnisse wurde mir aber auch offenbar, welchen Reiz das Entdecken für Ludwig Leichhardt hatte und wie sehr er die Schönheit Australiens bewunderte.

Ich verstehe die Benennungen von Gattungen und Arten nach meinem Großonkel durch die Forschung als Ehrung seines Andenkens wie auch als einen Bezug auf seinen Geist des Entdeckertums. Das Privileg der Forscher, eine Gattung oder Art benennen zu dürfen, macht mich in gewisser Weise staunen: In dieser Welt, in der wir alles zu kennen glauben, derer wir Menschen manchmal so überdrüssig scheinen, dass wir schon den Mars erkunden, soll es noch Lebewesen geben, die noch kein menschliches Auge bewusst als verschieden von anderen Lebewesen wahrgenommen hat? Fast wähne ich mich wie zu Zeiten meines Großonkels. Die "weißen Flecken" in der Flora und Fauna scheinen kleiner geworden zu sein. Aber es gibt sie immer noch! Wenn Forscher heute für ihre Entdeckung den Namen meines Großonkels wählen, so stellen sie sich in seine Tradition. Sie bestätigen den vielen Menschen innewohnenden Wunsch und Drang, Neues zu entdecken, zu forschen und zu Erkenntnissen zu kommen.

In diesem Sinne weiß ich mich durch den Namen meines Großonkels, der auch der meinige und nunmehr der Name dieser Gattungen und Arten ist, mit der Tradition des Entdeckertums und den heutigen Forschungen verbunden. Ich wünsche diesem Buch viel Erfolg und den daran beteiligten Forschern weiterhin Inspiration durch die Arbeit meines Großonkels und natürlich viele weitere Entdeckungen!

Ludwig Leichhardt, Explorer and Naturalist 1813–1848(?)

I am pleased that my great-great uncle, Ludwig Leichhardt, will be remembered with this special issue of the *Memoirs of the Queensland Museum*. His lifeworks will not only have a place in textbooks, but his morals, ideals and motivations will be recorded – including his search for honest science and his curiosity for exploration.

Our family has always remembered Ludwig Leichhardt, and we often think of him. As a young boy I knew that Leichhardt was a special man. Even when I was at school, my geography teacher approached me about this relative of mine, who wanted to explore the world, and who led a famous expedition in a faraway continent. It has been my life-long hobby to study the life of Leichhardt, especially his mysterious disappearance. Leichhardt was born in 1813 in Trebatsch, a small town about 100 km south-west of Berlin. Once he completed his educational studies, Leichhardt visited several European countries. In 1842 Leichhardt embarked on his first trip to Australia, where he was to lead several expeditions through uncharted territories. It was during Leichhardt's third and final Australian expedition in 1848, that he was to mysteriously vanish. Even to this day it is unclear how or where Leichhardt disappeared, and this remains a sad fascination. How could it be that during the middle of the 19th Century a group of explorers with instruments, luggage, maps etc. could just disappear without a trace? Because of this, the life story of Ludwig Leichhardt will always remain incomplete. It reminds me of the study of science – science continues to develop and celebrate discovery, but never seems to have an end. I have no doubt that the research and discoveries of Ludwig Leichhardt formed an important base to inspire and encourage the many explorers that followed, in much the way that science continues to build on the studies of earlier great men.

Obviously you cannot compare the life of Ludwig Leichhardt to modern explorers; however I have made a promise to myself that I will always remember him. Therefore, I have decided to

work with the Ludwig Leichhardt Society which is dedicated to studying the life of this great explorer. The Ludwig Leichhardt Society founded a small Museum dedicated to Ludwig Leichhardt in Trebatsch, and it is here that I will take part in the 200th birthday celebrations for my great-great uncle. During my life I have also visited Australia; however, I have to admit that I did not go on an expedition into the 'bush' to search for my ancestor, or to try and follow his footsteps. Instead I spent my time at seminars and spoke about my hometown, which was also Ludwig Leichhardt's hometown. I spoke about his research, and about the commemorative culture that surrounds his story. Many participants at the seminars have told me that my contributions and recountings at these events gave a certain authenticity and human form to their image of Ludwig Leichhardt — as if I were a modern version of him. I enjoy this image of myself, as it also contributes to my personal connection to him.

I have always admired my great-great uncle for his courage, to break away from his obedient German society, and his comfortable life, and make his way into unknown territory. Of course I cannot completely understand how a person from the 19th century felt when leaving his hometown to discover the world, however, I have several accounts from his memoirs of the difficulties he faced. What fascinates me was his courage to break out of the conservative image of the 19th century — saving money to fund an expedition into unknown territory and to persuade his fellow companions to come with him. Obviously there was a high price to be paid for being an explorer, and only a person with a strong personality could meet this challenge. However, through the documents and accounts I have of Ludwig Leichhardt, I can understand his desire to explore the beauty of Australia.

I appreciate that the species named after my great-great uncle are a way of remembering him and his discoveries. The privilege of having scientists name genera and species 'blows me away' — especially the knowledge that in our modern culture, where we believe everything is known, we can still find creatures that no one else has recognised before. It is almost like in the times of my great-great uncle. In choosing to honour the name of my ancestor, scientists are acknowledging a shared desire to discover and explore Australia's unique biodiversity.

By sharing my great-great uncle's name, I also feel connected to these new genera and species, and the tradition of exploration and scientific discovery. I wish this book great success, and may the life and work of my great-great uncle continue to inspire exploration and new discoveries.

Ludwig Leichhardt

(great-great nephew of Ludwig Leichhardt)

Berlin, 9 August 2013



Ludwig Leichhardt (great-great nephew of Ludwig Leichhardt)

(Translated and edited by Ms Ursula Baehr & Dr Barbara Baehr)

DEDICATION

This volume is dedicated to the German Explorer Ludwig Leichhardt in commemoration of his 200th birthday. Two other companion Volumes of the *Memoirs of the Queensland Museum – Culture* 7(1–2) describe his exploits and achievements through his diaries. The present Volume is a taxonomic treatise of zoology dedicated to Ludwig Leichhardt as a natural historian.

This project has set a milestone for the Queensland Museum in its ongoing quest to discover new life forms. It includes 18 taxonomic papers, dealing with 21 genera and 155 species, of which 9 genera and 123 species are new to science, most of them from Australia. The new taxa named after Leichhardt were all discovered in Australia, and mainly from Queensland, where he conducted his most successful expedition from Brisbane to Port Essington in 1844–1845.

Scientists from the Queensland Museum have led a team of Australian researchers in naming 2 new genera and 16 new species after Ludwig Leichhardt, and 2 new species honouring his colleagues Adolph Classen who was second-in-charge during Leichhardt's final expedition, and Andrew Hume who probably met Adolph Classen after Ludwig Leichhardt's final expedition failed.

We are pleased to acknowledge *BushBlitz*, a national biodiversity discovery partnership between the Australian Government, BHP Billiton and Earthwatch Australia (under the auspices of the Australian Biological Resources Study). *BushBlitz* has supported this special Leichhardt issue through its *Tactical Taxonomy Grant Scheme*, and in doing so has expanded our knowledge of Australia's unique biodiversity, in particular:

- the revision of the new swift spider genus *Leichhardtus* with 8 new species,
- the description of the two hollow chested goblin spiders *Cavisternum gillespieae* and *Cavisternum leichhardti*.

We thank also the National Science Foundation's PBI (Planetary Biodiversity Inventory) program provided through grant DEB-0613754 supporting the revision of the jelly bean goblin spider genus *Opopaea*.

Both projects provided support for the description of 113 species of which 96 are new to science.

Dr Barbara Baehr, Queensland Museum, Brisbane, September 2013

A new species of the genus *Coptoglossus* Chaudoir from Australia (Insecta: Coleoptera: Carabidae: Lebiini)

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ABSTRACT

As a supplement to the recent revision of the Australian lebiine genus *Coptoglossus* Chaudoir by the author, an additional new species, *Coptoglossus leichhardti* sp. nov., is described from Queensland, Australia, and incorporated into the most recent key to the genus. □ *Coleoptera*, *Carabidae*, *Lebiini*, *Coptoglossus*, new species, *Australia*, key to species.

During a recent visit to the Australian National Insect Collection, Canberra, I found among the extensive unidentified carabid material two specimens of an apparently undescribed species of the lebiine genus *Coptoglossus* Chaudoir, 1869 from south-eastern Queensland. Comparison with all described species of the genus corroborated this suggestion. Its description below is to be regarded as a supplement to my recent revision of the genus (Baehr 2012).

Baehr (2012) recognised the following four species in *Coptoglossus*: *C. sulcatulus* Chaudoir, 1869, *C. porphyriacus* (Sloane, 1910), *C. carteri* (Sloane, 1915), and *C. excisicollis* Baehr, 2012. Due to its rarity in collections the genus has been little documented, and its systematic position in either the Lebiini or the Platynini has been at issue (Baehr 2012). In the meantime the genus has been regarded as a basal one in the lebiine subtribe Pericalina.

MATERIALS AND METHODS

Measurements were taken using a stereo microscope with an ocular micrometer. Length has been measured from apex of labrum to apex of elytra. Length of pronotum was measured from the most advanced part of apex

to the most advanced part of base. Width of base of pronotum was measured at the position of the posterior lateral seta. Length of elytra was measured from the most advanced part of humerus to the very apex. For comparison, measurements and ratios of the other species of *Coptoglossus* are repeated.

For dissection of the female genitalia the specimen was softened for a night in a jar under moist atmosphere, then the genitalia were removed and subsequently cleaned for a short while in hot KOH. Habitus photographs were taken with a digital camera using ProgRes CapturePro 2.6 and AutoMontage and subsequently were worked with Corel Photo Paint X4.

The holotype of the new species is in Australian National Insect Collection, Canberra (ANIC), the paratype in the working collection of the author in Zoologische Staatssammlung, München (CBM).

SYSTEMATICS

Genus *Coptoglossus* Chaudoir

Coptoglossus Chaudoir, 1869: 124. – Baehr 2012: 86. For additional references see Baehr (2012).

Type. *Coptoglossus sulcatulus* Chaudoir, 1869, by monotypy.

Diagnosis. A genus of the tribe (or subfamily) Lebiini (-inae), and the subtribe Pericalina, characterised by almost uniformly black, dark piceous, or slightly violaceous colour, rather depressed eyes, complete and deep elytra striae and convex intervals, barely excised apex of the elytra, and tarsal claws not denticulate. A more detailed diagnosis is in Baehr (2012).

Distribution. Eastern Australia from eastern Victoria to south-eastern Queensland and inland as far as the Bunya Mountains..

Coptoglossus leichhardti sp. nov.
(Figs 1-3)

Etymology. The name is a patronym in honour of Ludwig Leichhardt, the famous German explorer of inland Queensland who started his major expedition near the Bunya Mountains. These mountains would have been in view to the north during the first weeks of his expedition in September 1844 as his party moved across the Darling Downs gathering equipment and supplies from the early settlers. Two other Australian Carabidae bear his name: *Pseudillaphanus leichhardti* Giachino 2005 and *Dystrichothorax leichardtensis* Baehr 2006.

Material examined. HOLOTYPE: ♀, AUSTRALIA, Qld Bunya Mt. 26.52 S - 141.40 E / 11.12.82; E-Y: AU-63 logs and bark, Endroedy-Younga (ANIC). PARATYPE: 1♀, same data as holotype (CBM).

Diagnosis. Distinguished from all other species, except the small *C. sulcatulus* Chaudoir which has an exceptionally wide prothorax, by lesser body size and comparatively wide basis of the rather parallel-sided, barely cordiform pronotum. Further distinguished from the most similar species *C. carteri* (Sloane) by shorter antenna.

Description. Measurements. Length: 8.2-8.4 mm; width: 3.35-3.4 mm. Ratios. Width/length of pronotum: 1.29-1.32; width of widest diameter/base of pronotum: 1.09-1.11; width of pronotum/width of head: 1.18-1.21; length/width of elytra: 1.48-1.52.

Colour (Fig. 1). Black, in the paratype reddish-piceous, probably due to immaturity; head in the holotype very dark piceous; pronotum and elytra with very indistinct, narrow,

reddish margin; labrum, mandibles, palpi, and antennae reddish-piceous. Legs dark brown to almost black, but knees and tarsi slightly lighter. Lower surface in middle reddish-piceous, laterally darker, almost black.

Head (Fig. 2). Rather elongate (in group), eye comparatively small, laterally moderately protruded, orbit rather short, oblique-convex. Clypeus comparatively elongate and trapezoidal, apical margin of labrum very slightly sinuate. Mandibles elongate. Frontal furrows short and shallow, anterior-median part of frons with a slightly triangular impression. Antennae comparatively short, surpassing the base of the pronotum by at most two antennomeres, 6th and 7th antennomeres c. 1.5 x as long as wide. Posterior supraorbital seta situated at about posterior margin of eye. Surface of head here and there with traces of extremely fine, very superficial, isodiametric microreticulation; very fine punctures but no pilosity visible, surface glossy.

Pronotum (Fig. 2). Fairly wide, distinctly wider than head, widest slightly in front of middle. Apex moderately excised, anterior angles slightly produced but rounded at tip; lateral margin anteriorly convex, in basal half slightly oblique and almost straight. Base in middle straight, laterally rather oblique, basal angle obtusely angulate, about 100°, laterad not produced. Apex not margined except near angles, base laterally rather coarsely margined, in middle not perceptibly margined. Lateral margin anteriorly narrow, moderately widened towards base, margin upturned, marginal channel rather deep, posteriad explanate. Disk slightly convex, median line rather deep and almost complete, anterior transverse sulcus moderately deep, posterior transverse sulcus deep. Anterior lateral seta inserted behind apical third, slightly in front of widest diameter, seta slightly removed from margin. Posterior lateral seta inserted at basal angle. Surface with many fine, shallow, more or less distinct, slightly irregular, transverse striae, with extremely fine and superficial, slightly transverse microreticulation which is difficult to recognise between the striae, and with very fine punctures and extremely short, almost

TABLE 1. Measurements and ratios of all described species of *Coptoglossus*. l, body length in mm; w/l pr, width/length of pronotum; d/b pr, width widest diameter/base of pronotum; pr/h, width pronotum/head; l/w el, length/width of elytra.

Species	No. of spms	l	w/l pr	d/b pr	pr/h	l/w el
<i>sulcatulus</i>	5	6.4-6.6	1.46-1.48	1.14-1.17	1.13-1.16	1.43-1.47
<i>porphyriacus</i>	5	9.1-10.6	1.24-1.25	1.14-1.18	1.11-1.14	1.58-1.61
<i>excisicollis</i>	5	12.4-13.9	1.14-1.18	1.28-1.35	1.25-1.30	1.42-1.43
<i>carteri</i>	6	8.9-10.6	1.28-1.30	1.13-1.20	1.23-1.28	1.47-1.51
<i>leichhardti</i>	2	8.2-8.4	1.29-1.32	1.09-1.11	1.18-1.21	1.48-1.52

erect pilosity, barely perceptible, even under very high magnification; surface fairly glossy.

Elytra (Fig. 3). Rather short and wide, barely widened towards apical third, dorsal surface moderately convex. Humerus widely rounded, lateral margin very slightly convex, apex oblique, barely sinuate, incurved towards suture. Lateral channel moderately wide, lateral margin slightly upturned. Striae deep, at bottom not or barely crenulate, intervals convex. Anterior discal puncture located at 3rd stria, both median and posterior punctures in middle of 3rd interval. 12-13 marginal punctures present, series widely interrupted in middle. Setae of different length but some very elongate. Microreticulation on intervals very fine and dense, markedly transverse, punctures extremely fine and barely recognisable, pilosity very short and only recognisable at very high magnification and in lateral view, slightly declined; surface moderately dull but somewhat sericeous.

Lower surface. Metepisternum moderately elongate, c. 1.75 x as long as wide at apex. Terminal abdominal sternum in the female quadrisetose. Microreticulation extremely fine, on thorax slightly more superficial than on abdomen, isodiametric to slightly transverse.

Legs. Rather elongate. 5th tarsomeres with a pair of fine setae on the lower surface. Tarsal claws large, edentate. Squamosity of male protarsus unknown.

Male genitalia. Unknown.

Female gonocoxites (Fig. 3). Gonocoxite 1 large and elongate, asetose at the apical rim; gonocoxite 2 comparatively short, curved, with acute apex; with a large, elongate dorso-median ensiform seta and two stout but elongate

ventro-lateral ensiform setae; apparently without a nematiform subapical seta although the basal pit is present.

Variation. Little variation noted, except for colour, but the paratype may not be fully coloured.

Distribution. Bunya Mountains in south-eastern Queensland.

Collecting circumstances. The two known specimens were collected at, or under, "logs and bark".

Relationships. On the basis of body shape and surface structure it is probably closest to *C. carteri* (Sloane), but in the absence of male genitalia this status has to be verified.

REVISED KEY TO THE SPECIES OF COPTOGLOSSUS

For convenience, figure numbers from Baehr (2012) are cited as Baehr/fig x.

1. Small species, body length <7 mm; pronotum wide, ratio width/length >1.45; eye large and laterally well projected (Baehr/fig. 5); aedeagus large and stout, with triangular, symmetric apex (Baehr/fig. 10) *sulcatulus* Chaudoir, 1869
- Larger species, body length >8 mm; pronotum narrower, ratio width/length <1.32 (Fig. 2; Baehr/figs 6-9); eye varied but when large and strongly projecting laterally, elytra with distinct violaceous tinge (Baehr/fig. 3); aedeagus either narrower, or with differently shaped, not triangular or asymmetric apex (Baehr/figs 11-13), or unknown. 2.

2. Very large species, body length >12 mm; pronotum narrow, with short but deep excision in front of basal angle, also apex deeply excised and apical angle markedly protruding (Baehr/fig. 9); elytra short and wide, perceptibly oval with dorsal surface convex (Baehr/fig. 4); aedeagus very stout and high, with somewhat lancet-shaped apex (Baehr/fig. 13); gonocoxite 2 very narrow and elongate (Baehr/fig. 17) *excisicollis* Baehr, 2012
- Smaller species, body length <10.6 mm; pronotum wider, lateral margin barely excised in front of basal angle, apex less deeply excised and apical angle much less protruding (Fig. 2; Baehr/figs 6-8); either elytra short and wide but not oval-shaped, and more depressed (Fig. 1; Baehr/fig. 3), or elytra dorsally convex but much longer and narrower, and rather parallel-sided (Baehr/fig. 2); aedeagus less stout and high, with asymmetrically triangular or spoon-shaped apex (Baehr/figs 11, 12), or unknown; gonocoxite 2 short and stout (Fig. 3; Baehr/figs 15, 16) 3.
3. Elytra black, short and wide and rather depressed, ratio length/width <1.52 (Fig. 1, Baehr/fig. 3); eye in both sexes moderately protruded laterally (Fig. 2; Baehr/fig. 8); aedeagus less stout, with asymmetrically triangular apex (Baehr/fig. 12), or unknown . . 4.
- Elytra distinctly violaceous, narrow and elongate, dorsally convex, ratio length/width >1.6 (Baehr/fig. 2); eye in male laterally well protruded (Baehr/fig. 6); aedeagus stouter, with wide, spoon-shaped apex (Baehr/fig. 11) *porphyriacus* (Sloane, 1910)
4. Body size larger, >8.9 mm, usually larger; base of pronotum narrower as compared with widest diameter, ratio width of diameter/base >1.13, usually more; eye less protruded, orbits longer and less oblique (Baehr/fig. 8); median antennomeres almost twice as long as wide; aedeagus as in Baehr/fig. 12 *carteri* (Sloane, 1915)
- Body size smaller, <8.4 mm; base of pronotum wider as compared with widest diameter, ratio width of diameter/base <1.11; eye more protruded, orbits shorter and more oblique (Fig. 2); median antennomeres 1.5 x as long as wide; aedeagus unknown. *leichhardti* sp. nov.

Remarks. As discussed in Baehr (2012) the genus *Coptoglossus* belongs in the lebiine subtribe Pericalina, in the sense of Lorenz (2005), although in that catalogue it was still placed in the tribe Platynini. Indeed, due to the non-denticulate tarsal claws, the not or barely excised apex of the elytra, and the appearance of the body it is understandable why the genus was included in Platynini by several previous authors. All these character states are plesiomorphic ones within the tribe Lebiini and rather similar in many genera of Platynini. The structure of the labrum and of the female gonocoxites reveal that the genus belongs in the lebiine subtribe Pericalini, but due to a number of plesiomorphic character states its position must be right at the base of this subtribe. Therefore the genus certainly belongs among the most plesiotypic lebiine genera (if plesiotypic means a short distance to the base of the phylogenetic tree of the group).

Grouping of the new species within the genus is still difficult, because the squamosity of the male protarsus is unknown. The genus divides into two groups, one, including *C. sulcatulus* and *C. porphyriacus*, possesses biserially squamose protarsi which is the plesiomorphic state, whereas *C. carteri* and *C. excisicollis* possess uniserially squamose protarsi. In view of its overall similarity to *C. carteri*, *C. leichhardti* may belong to the second group.

Specimens of *Coptoglossus* still are very rare in collections, and it is unknown why they are so rarely collected. Accordingly, little information is available about their habitat preferences and almost nothing is known about their habits and life histories. The few recorded collecting circumstances are quite different and include Malaise and intercept trapping as well as bark fogging of logs and trunks, and collecting from or under logs. But almost all recorded localities seem to be located in rain forest, either (montane) subtropical rain forest or temperate and upland *Nothofagus* rain forest. It seems, thus, that the species of this genus probably live on or under the bark of trees and logs.

The other four species of the genus all have a rather wide range which in some extends



FIG. 1. *Coptoglossus leichhardti* sp. nov. Habitus of the paratype, body length 8.4 mm.

from south-eastern Victoria to south-eastern Queensland. The ranges of most species widely overlap and at certain localities two species have been found to occur sympatrically or even syntopically. *Coptoglossus leichhardti* occurs in an area from which both *C. sulcatulus* and *C. carteri* have been recorded. How these quite similarly sized and shaped species avoid competition is unknown.



FIG. 2. *Coptoglossus leichhardti* sp. nov. Head and prothorax of the paratype.



FIG. 3. *Coptoglossus leichhardti* sp. nov. Female gonocoxite 2 of the holotype. Scale bar: 0.1 mm.

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Two new monotypic genera of Queensland millipedes (Diplopoda: Polydesmida: Paradoxosomatidae)

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ABSTRACT

Eungellosoma gen. nov. is erected for *E. leichhardti* sp. nov. and *Binarcifer* gen. nov. for *B. superbus* sp. nov. Both new species have a gonopod telopodite deeply divided into branches and are here placed in Australiosomatinae: Australiosomatini. □ *Diplopoda*, *Polydesmida*, *Paradoxosomatidae*, *Queensland*, *Australia*.

Queensland has a diverse fauna of paradoxosomatid millipedes, with 31 described and at least 200 undescribed species (Mesibov, 2008). In 2006–07, the undescribed species known to date were sorted into coded taxa (e.g. genus QA, species QA1) by the author and Catherine Car. Among these undescribed species are Australiosomatini with the gonopod acropodite deeply divided into branches and obvious (although reduced) paranota. Some of the new species clearly belong in genera already known from Queensland: *Cladethosoma* Chamberlin, 1920, *Heterocladosoma* Jeekel, 1968, *Paraaustraliosoma* Verhoeff, 1924, *Phyllocladosoma* Jeekel, 1968 and *Streptocladosoma* Jeekel, 1980. Other species just as clearly represent novel lineages, and in this paper I describe two particularly interesting Australiosomatini for which new generic names are needed. I suspect that both new genera will lose their monotypic status when Queensland's rich millipede fauna has been more thoroughly sampled.

MATERIALS AND METHODS

Specimens are stored in 75% ethanol in the Queensland Museum. Photomicrographs were taken with a Canon EOS 1000D digital SLR camera mounted on a Nikon SMZ800 binocular dissecting microscope equipped with a beam splitter. The photomicrographs in the

figures are manually stacked composites, processed with Zerene Stacker 1.04 software. Measurements of dissected specimens were made with the same microscope using an eyepiece scale. Preliminary gonopod drawings on graph paper were made using an eyepiece grid at 160X on a binocular microscope. Collection data is given below as seen on specimen labels, with additional information in brackets; the latitude/longitude datum is WGS84. Abbreviations: Qld = Queensland; QM = Queensland Museum, Brisbane.

SYSTEMATICS

Order Polydesmida Pocock, 1887

Suborder Strongylosomatidea
Brölemann, 1916

Family Paradoxosomatidae Daday, 1889

Subfamily Australiosomatinae
Brölemann, 1916

Tribe Australiosomatini Brölemann, 1916

Eungellosoma gen. nov.

Type species. *Eungellosoma leichhardti* sp. nov., by present designation.

Etymology. For the Eungella district in Queensland, and *-soma* (from Greek 'body'), commonly used as a suffix in genus names for Paradoxosomatidae; neuter gender.

Diagnosis. Genus in Australiosomatinae: Australiosomatini with reduced but obvious paranota; gonopod acropodite divided at mid-length into four distally directed processes and a lateral tab; prostatic groove looping from anterior to posterior across base of tab before entering solenomere; central process laminate, cradling tip of solenomere, and with thin sub-process arising from distal margin of process curving medially and distally.

Remarks. *Eungellosoma leichhardti* sp. nov. shares a prostatic groove looping on a short tab with species in two other genera of Australiosomatinae: *Australodesmus* Chamberlin, 1920 and *Dicladosomella* Jeekel, 1982. In both genera the paranota are reduced but obvious, and Jeekel (1968) at first placed *Australodesmus* in Australiosomatini. He later decided it was more closely related to genera in Antichiropodini Brölemann, 1916 (Jeekel, 1979), but recognised that the indirect course of the groove made *Australodesmus* unique in that tribe. The tab is medial in *Australodesmus* and lateral in *Dicladosomella* and *Eungellosoma*, and in *Eungellosoma* the loop crosses the base of the tab, rather than the tip as in the other two genera. In general form, the *Eungellosoma* telopodite resembles that of *Gigantowales* Verhoeff, 1937 (Australiosomatini) in that the acropodite breaks up at mid-length into four distally directed processes, but the prostatic groove in *Gigantowales* runs more or less straight to the base of the solenomere, and there is no lateral tab.

Eungellosoma leichhardti sp. nov.
(Figs 1–3, 7, 8)

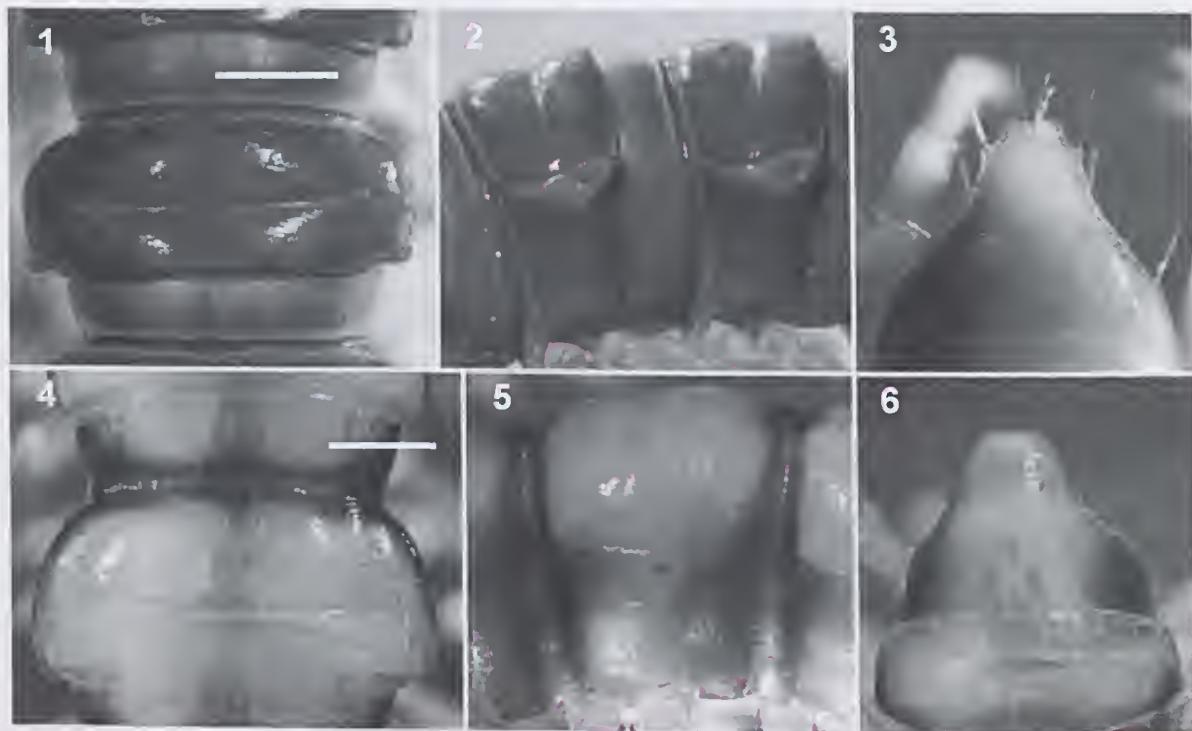
Etymology. For Ludwig Leichhardt (1813–?1848), naturalist and explorer; adjective.

Material Examined. Holotype: Male, Dalrymple Road, Eungella National Park, Qld, 21°02'S 148°36'E, 29 July – 4 December 1992, R. Raven, P. and E. Lawless and M. Shaw, QM pitfall NQ39, rainforest, QM S74955; dissected. (Elevation ca 950 m a.s.l., estimated uncertainty ±1 km.)

Paratypes: 2 males, Upper Cattle Creek, Eungella, Qld, 21°02'S 148°36'E, 17 November 1992, G. Monteith, G. Thompson, D. Cook and H. Janetzki, QM S74954; dissected. (Location listed as 21°01'41"S 148°36'11"E in the QM Entomology database; ca 950 m a.s.l., estimated uncertainty ±500 m.)

Other material examined. None.

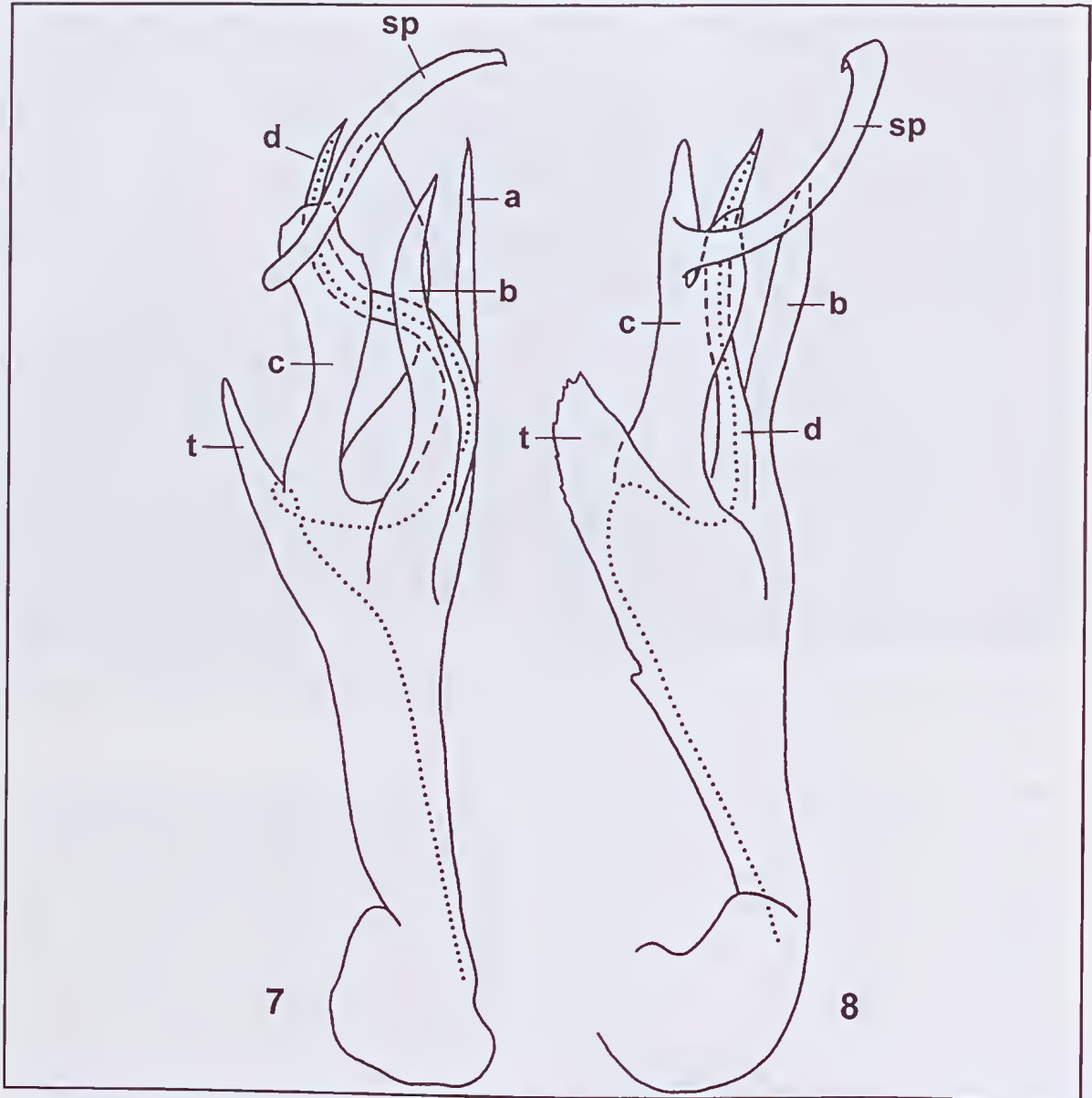
Description. *Somatic features.* Length ca 17 mm; midbody rings with maximum vertical diameter ca 1.5 mm, maximum width including paranota ca 1.7 mm. Colour of paratypes in alcohol medium reddish brown, darker anteriorly, with lighter paranota; legs, epiproct and antennal tips pale yellow. Holotype light brown above, fading to pale yellow beneath; anterior and posterior metatergal margins each marked with narrow, dark brown line. Head slightly narrower than collum; vertex and frons sparsely setose, clypeus lightly setose; vertigial sulcus clearly defined to level of top of antennal sockets; postantennal groove shallow; sockets separated by 1.0x socket diameter. Antenna reaching just past tergite 3 when stretched; antennomere 6 widest; relative antennomere lengths (2, 3, 6) >(4, 5). Collum in dorsal view with anterior margin nearly straight and posterior margin very slightly emarginate; smoothly rounded laterally with no trace of posterior angle. Relative ring widths 6 >5 >(4, collum) >(2, 3); ring widths 6–16 about equal. Diplosegments (Figs 1, 2) with pronounced waist, narrow zone anterior to metatergite with cellular structure, suture inconspicuous; metazonite smooth, prozonite with very faint polygonal microsculpture. Tergites with distinct transverse furrow, not extending laterally as far as paranota. A few setae in transverse row on metatergite, midway between transverse furrow and anterior metatergal margin. Pleural keels present as small but detectable bulges on rings 2–4. Lateral margin of ring 2 paranotum well below lateral collum margin and ring 3 paranotum; slightly upturned laterally with rectangular anterior corner. Distinct but much-reduced paranota on rings 3–17, in dorsal view (Fig. 1) very slightly convex laterally, not extending past posterior metatergal margin, with narrow, shallow dorsal sulcus; paranotum just above mid-height in lateral view (Fig. 2). Pore formula 5, 7, 9, 10, 12, 13, 15–19; ozopores



FIGS 1–6. *Eungellosoma leichhardti* sp. nov., paratype ex QM S74954 (1–3), *Binarcifer superbus* sp. nov., holotype, QM S75043 (4–6). Midbody rings in dorsal view (1, 4) and lateral view (2, 5), and dorsal views of epiproct (3, 6). Scale bars in (1) and (4) = 0.5 mm; remaining figures not to same scale.

round, opening laterally on paranotum at between 1/2 and 2/3 of paranotum length from anterior margin. Spiracles well-separated on diplosegments; both spiracles subcylindrical and protruding, with fine surface texture (not resolvable with optical microscopy). Sternites a little wider than long, not setose, transverse impressions deeper than longitudinal. Rounded-trapezoidal lamella between legs 4 on ring 5. Paired tufts of sparse setae between legs 5, paired tufts of shorter setae between legs 7. Legs slender, length at midbody ca 1.3x times ring height; relative podomere lengths at midbody femur > tarsus > prefemur > (postfemur, tibia). Anterior legs without setal brushes on tarsi; medial surface of leg 1 femur with very small, short, finger-like process. Preanal ring with only a few marginal setae. Epiproct (Fig. 3) with tip truncate, posterior and lateral setal papillae slightly produced; spinnerets in square array. Hypoproct trapezoidal.

Gonopods. Gonocoxa short, stout, tapering distally, setose anteriorly; emerging from aperture with anterior rim produced and thickened as rounded ridge. Telopodite (Figs 7, 8) straight, reaching base of leg 7 when retracted; base densely setose on posteromedial surface. Telopodite with constriction just distal to base on lateral surface, clearly separating setose prefemoral portion from bare acropodite. Acropodite expanded distally, divided at half telopodite height into short lateral tab and four processes, a–d. Process a arises from anteromedial surface; thin, sharply pointed, gently curved posteriorly. Process b arises from posteromedial surface; slightly wider than process a and sharply pointed; sinuous, curving first anteriorly, then posteriorly, then anteromedially to terminate at same height as process a. Process c arises more or less centrally on acropodite just distal to origins of a and b; expanded distally into laminate structure, the lamina tightly curved with medial concavity; distal margin broadly pointed anteriorly, notched laterally,



FIGS 7, 8. *Eungellosoma leichhardti* sp. nov., paratype ex QM S74954. Right gonopod telopodite, posterior and slightly medial (7) and lateral (8) views. Processes a-d labelled as in text; sp = sub-process of c, t = lateral tab. Process a not visible in lateral view; setae on base not shown. Dotted lines mark course of prostatic groove.

roughly triangular posteriorly, the anterior distal margin terminating at same height as processes a and b; a narrow, flattened, strap-like sub-process arising from the distal margin of process c on anterior side of lateral notch, directed posteriorly, then curving medially

around anterior portion of laminate process c structure and extending distomedially, terminating in flattened, rounded apex distal and slightly medial to process a and b tips. Process d (= solenomere) arises medial to process c base; a little wider than process a, curving medially

between processes a and b, then laterally, then distally, the pointed apex cradled in the process c concavity. Lateral tab directed distolaterally, terminating at about 1/3 the height of process a, roundly pointed, the distal and anterior edges minutely toothed. Cannula prominent; prostatic groove running anterodistally on lateral surface of acropodite to base of lateral tab, looping posteriorly across base of tab, then running medially to enter base of process d, terminating at process d tip. With right and left telopodites in situ, the respective processes b and sub-processes of c cross at the midline.

Distribution and habitat. So far known only from tropical rainforest in Eungella National Park, Queensland (Fig. 11).

Remarks. This species was coded as 'genus QN, species QN1' in the 2006-07 sorting of Queensland Paradoxosomatidae (Mesibov 2008).

Binarcifer gen. nov.

Type species. *Binarcifer superbus* sp. nov., by present designation.

Etymology. Latin *binus* ('pair') + Latin *arcus* ('bow') + Latin *fero* ('bear'), masculine gender, referring to the paired, bow-like, lateral branches on the gonopod telopodite.

Diagnosis. Genus in Australiosomatinae: Australiosomatini with reduced but obvious paranota; gonopod acropodite divided at base above strong constriction into bifurcated lateral branch smoothly curving medially, and sickle-shaped, medially concave medial branch with short, basal, distomedially directed sub-branch; solenomere = posterior sub-branch of lateral branch.

Remarks. The deep division of the acropodite in *Binarcifer superbus* sp. nov. into medial and lateral branches, each further divided, is also seen in species of *Heterocladosoma* Jeekel, 1968 and *Hoplatessara* Verhoeff, 1928, and in all three genera the solenomere is the posterior-most of the sub-branches of the lateral branch. However, the shape and medial curvature of the medial branch in *B. superbus* sp. nov. is distinctive. In *Heterocladosoma* and *Hoplatessara* species the

medial branch (or branches) is either straight or directed laterally near the apex.

Binarcifer superbus sp. nov. (Figs 4-6, 9, 10)

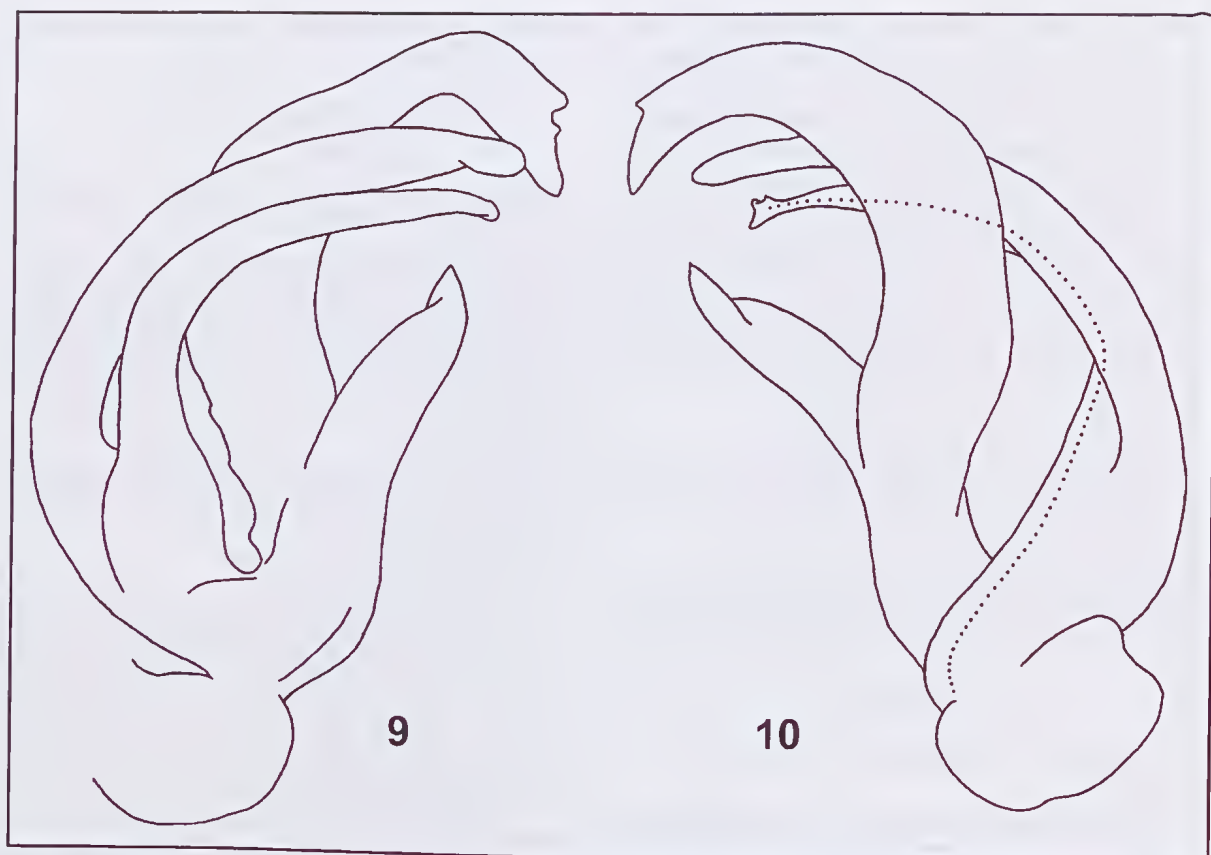
Etymology. Latin *superbus* ('excellent'), adjective; also a reference to the type locality.

Material Examined. Holotype: Male, Mt Superbus, Qld, 28°14'S 152°28'E, October 1990 - 24 April 1991, T.B. Churchill, pitfall, QMS75043. (According to advice from T.B. Churchill on 22 March 2013, her collecting site on Mt Superbus was the summit plateau, listed as 28°13'31"S 152°27'17"E in the QM Entomology database; ca 1320 m a.s.l., estimated uncertainty ±1 km.)

Paratype: Male, Mt Superbus, Qld, 2 August 1990, T.B. Churchill, night collecting, QM S33346. (Additional data as for holotype.)

Other material examined. None.

Description. *Somatic features.* Length ca 20 mm; midbody rings with maximum vertical diameter ca 1.7 mm, maximum width including paranota ca 2 mm. Holotype in alcohol patterned in pale yellow-brown and medium brown; lightest colour dorsally on collum and pro- and metazonites; light laterally on vertex, legs, epiproct and metazonites below paranota; dark around waist, laterally on prozonites, tips of legs and antennae; dark 'mask' around antennal sockets on frons and clypeus. Paratype bleached of colour. Head slightly wider than collum; vertex bare, frons and clypeus sparsely setose; vertigial sulcus clearly defined to level of top of antennal sockets; postantennal groove shallow; sockets separated by 1.2x socket diameter. Antenna reaching tergite 3 when stretched; antennomere 6 widest; relative antennomere lengths (2, 3, 6) > (4, 5). Collum in dorsal view with anterior margin convex and posterior margin very slightly emarginate; lateral margin short, almost straight, with slightly rounded anterior and posterior corners. Relative ring widths 6 > 5 > (collum 2, 3, 4); ring widths 6-16 about equal. Waist pronounced on diplosegments (Figs 4, 5), with faint longitudinal striations; suture inconspicuous; metazonite smooth, prozonite with very faint polygonal microsculpture. Tergites with distinct transverse furrow, not extending laterally as far as paranota. Pleural keels present as small



FIGS 9, 10. *Binarcifer superbus* sp. nov., paratype, QM S33346. Right gonopod telopodite, posterolateral (9) and anterior (10) views. Setae on base not shown. Dotted line marks course of prostatic groove.

bulge on ring 2, barely detectable swellings on rings 3, 4. Lateral margin of ring 2 paranotum well below lateral collum margin and ring 3 paranotum, with rectangular anterior and posterior corners. Distinct but much-reduced paranota on rings 3-18; in dorsal view (Fig. 4) with paranotal margin curving anteromedially, posterior end of paranotum not extending past posterior metatergal margin, dorsal sulcus barely detectable; paranotum at mid-height in lateral view (Fig. 5). Pore formula 5, 7, 9, 10, 12, 13, 15-19; ozopores round, opening laterally on paranotum at ca 3/4 of paranotum length from anterior margin. Spiracles well-separated on diplosegments; both spiracles slightly protruding, with fine sculpturing (not resolvable with optical microscopy). Sternites as wide as long, lightly setose; impressions very shallow, transverse impressions slightly deeper than longitudinal.

Rounded-triangular lamella between legs 4 on ring 5. Legs slender, length at midbody ca 1.5x times ring height; relative podomere lengths at midbody tarsus > femur > (prefemur, tibia) > postfemur. Anterior legs without setal brushes on tarsi; medial surface of leg 1 femur with small, short, bluntly rounded process. Preanal ring with only a few marginal setae. Epiproct (Fig. 6) wide, roundly truncate, setal papillae not evident; spinnerets in square array. Hypoproct rounded-trapezoidal.

Gonopods. Gonocoxa short, stout, only slightly tapered distally, setose anteriorly; emerging from aperture with anterior rim not produced. Telopodite (Figs 9, 10) reaching base of leg 7 when retracted; base densely setose on posteromedial surface. Telopodite with strong constriction just distal to base, clearly separating setose prefemoral portion from bare acropodite.

Acropodite divided at base into two massive branches. Lateral branch smoothly curving medially and slightly posteriorly, terminating near body midline, divided at ca 1/4 acropodite height into cylindrical posterior and anterior sub-branches of approximately equal length. Posterior sub-branch (= solenomere) slightly tapered, flattening near tip with pointed, anteriorly directed apex; anterior sub-branch a little larger than posterior, paralleling posterior sub-branch and a little distal to it, terminating in bluntly rounded, slightly twisted apex. Main portion of medial branch of acropodite sickle-shaped, curving medially in transverse plane, anteroposteriorly flattened, twisting near apex to be dorsoventrally flattened, terminating just distal to lateral branch tips in expanded tip with small, rounded, marginal (medial) notch. A short, cylindrical sub-branch arising at ca 1/3 acropodite height on medial branch, directed distomedially, terminating near body midline in bluntly pointed, slightly twisted apex lying just basal and a little anterior to tips of lateral branch. Cannula prominent; prostatic groove running on medial surface of posterior sub-branch of lateral branch to pointed tip, without loop or other deviation.

Distribution and habitat. So far known only from subtropical rainforest on Mt Superbus in southeastern Queensland (Fig. 11).

Remarks. This species was coded as 'genus QTT, species QTT1' in the 2006-07 sorting of Queensland Paradoxosomatidae (Mesibov, 2008).

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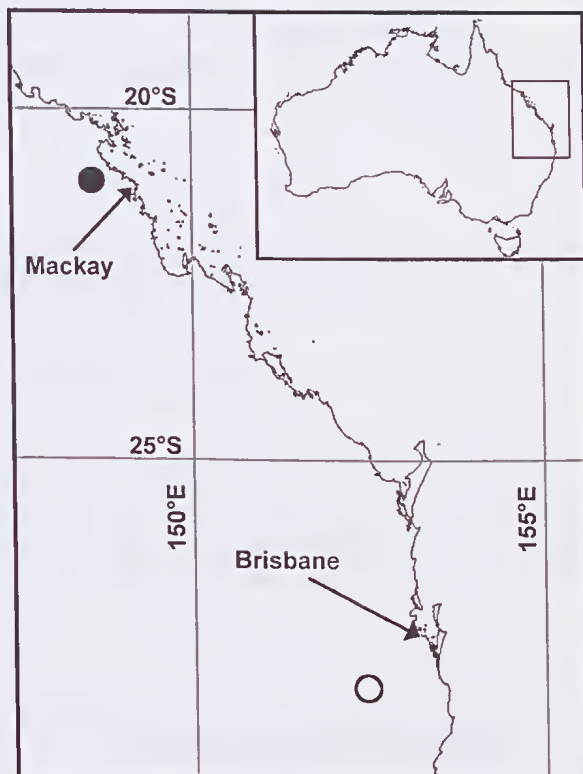


FIG. 11. Localities of *Euangelosoma leichhardti* sp. nov. (solid circle) and *Binarcifer superbis* sp. nov. (open circle). Inset shows location of main map. Geographic projection. The two localities are ca 890 km apart.

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A new species of *Terrisswalkerius* (Megascolecidae, Megascolecinae, Oligochaeta) from the Wet Tropics of Queensland

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ABSTRACT

A description is provided of a new species of the megascolecoid earthworm genus *Terrisswalkerius*: *T. leichhardti* sp. nov. A revised generic definition and a key to species are given. □ *Earthworms*; *Clitellata*; *Megascolecidae*; *Megascolecinae*; *Terrisswalkerius leichhardti* new species.

In a taxonomic account of the species of the megascolecine genus *Diporochaeta* in Queensland, Jamieson (1976) drew attention to the widely disjunct distribution of the Queensland species relative to other, south-eastern Australian species of the genus. Subsequently (Jamieson, 1994), in a cladistic analysis of morphology, the 16 then known north Queensland species of *Diporochaeta* were transferred to the new genus *Terrisswalkerius*. Later, a molecular analysis using nuclear 28S rDNA and mitochondrial 12S and 16S rDNA (Jamieson *et al.* 2002) confirmed separation of *Terrisswalkerius* and its sister-genus *Fletcherodrilus* Michaelsen, 1891, from *Diporochaeta*. That finding was confirmed by Buckley *et al.* (2011) from analysis of mitochondrial 16S rRNA and 661 base pairs from the nuclear large subunit (28S) rRNA gene. They rejected transfer (Blakemore 2006, see also 2011) of the *Terrisswalkerius* species used in their analysis to *Perionychella* and/or to *Diporochaeta* because *Terrisswalkerius* was a well-supported clade five nodes from these genera and inclusion would have made them

even more polyphyletic. It is a phylogenetically and zoogeographically discrete genus although the anomalous position of *T. athertonensis* requires further investigation. A striking morphological distinction from these genera is the absence of accessory genital markings.

This account of a new species of *Terrisswalkerius* collected in the Australian Wet Tropics in January to March 2007 augments the monographic CDs of Jamieson (2000, 2001), for Megascolecinae. The specimens were collected as part of an ongoing study of molecular phylogeny of the Oligochaeta.

Terrisswalkerius Jamieson, 1994

Terrisswalkerius Jamieson, 1994: 158–159; 2000: 1344; 2001: 1344–1345.

Type-species. *Perichaeta canaliculata* Fletcher, 1887.

Diagnosis. Setae numerous (>14) per segment. Genital markings other than porophores bearing the female, male and spermathecal

pores, absent. A pair of combined pores of vasa deferentia and tubular or tubuloracemose prostates on XVIII. Last hearts in XII or XIII. Gizzard in V or VI (or VII?) (well developed); intestinal caeca and typhlosole absent. Extramural calciferous glands absent. Nephridia stomate exonephric holonephridia with or without bladders; their pores in straight or sinuous lines but never with regular alternation. Spermathecae 1 to 5 pairs, rarely unpaired midventral, always pretesticular, diverticulate; diverticulum usually single, uniloculate; rarely double, rarely multiloculate.

Distribution. Eastern Subregion, Torresian Division: the Wet Tropics of north eastern Queensland, from the Paluma Range, 19°S, near Townsville, north to the McIlwraith Range, at 13°44'S.

REVISED KEY TO SPECIES OF *TERRISSWALKERIUS*

1. a. Spermathecal pore unpaired, midventral in intersegmental furrows 7/8 and 8/9. (Differing from *Fletcherodrilus* in having paired spermathecae) ... *T. miseriae* Jamieson, 1997
 - b. Spermathecal pores paired; if unpaired not restricted to 7/8 and 8/9 2
2. (1b) a. Spermathecal pores 5 pairs, in or shortly behind intersegmental furrows 4/5–8/9 3
 - b. Spermathecal pores 1 to 4 pairs (rarely unpaired, midventral), in or shortly behind some of intersegmental furrows 4/5–8/9 .. 5

Spermathecal pores 5 pairs

3. (2a) a. Spermathecal pores in *a* or *b* lines. Last hearts in XIII. (Spermathecal duct very short.) *T. grandis* (Spencer, 1900)
 - b. Spermathecal pores median to *a* lines. Last hearts in XII. (Spermathecal duct at least one fourth length of ampulla) 4
4. (3b) a. Nephridial bladders absent *T. phalacrus* (Michaelsen, 1916)
 - b. Nephridial bladders present *T. atavius* (Michaelsen, 1916)
5. (2b) a. Spermathecal pores in 4 intersegments, 5/6–8/9 or 4/5–7/8, paired or single 6

- b. Spermathecal pores 3 pairs or fewer . 10

Spermathecal pores in 4 intersegments

6. (5a) a. Spermathecal pores in 5/6–8/9, unpaired, midventral ... *T. mcdonaldi* Jamieson, 1994
 - b. Spermathecal pores 4 pairs, in 4/5–7/8 or 5/6–8/9 7
7. (6b) a. Spermathecal pores 4 pairs, in 4/5–7/8 *T. terrareginae* (Fletcher, 1890)
 - b. Spermathecal pores 4 pairs, in 5/6–8/9 .. 8
8. (7b) a. Male pores well median of *a* lines *T. millaamillaa* (Jamieson, 1976)
 - b. Male pores in or lateral of *c* lines 9
9. (8b) a. Prostomium tanylobous, with wide dorsal tongue. (Peristomium short). Nephropores in straight series on each side *T. erici* (Michaelsen, 1916)
 - b. Prostomium epilobous or proepilobous; with longitudinal grooves which continue to the hind margin of the peristomium. Nephropores in an irregularly sinuous series, varying from far dorsally to far ventrally, on each side *T. kuranda* (Jamieson, 1976)
10. (5b) a. Spermathecal pores 3 pairs, in or shortly behind 4/5–6/7, 5/6–7/8, or 6/7–8/9 11
 - b. Spermathecal pores 1 or 2 pairs, in some of 4/5–8/9 18

Spermathecal pores 3 pairs

11. (10a) a. Spermathecal pores 3 pairs, in 4/5–6/7 12
 - b. Spermathecal pores 3 pairs, in or shortly behind 5/6–7/8 or 6/7–8/9 15
12. (11a) a. Spermathecal diverticulum clavate, shorter than ampulla 13
 - b. Spermathecal diverticulum long and tortuous. Spermathecal pores in vicinity of *d* to *e* lines 14
13. (12a) a. Spermathecal pores approximately in *c* lines. Male porophores partly formed by evagination of muscular prostate ducts *T. carbinensis* Jamieson, 1997
 - b. Spermathecal pores in or between *a* and *b* lines. Male porophores not formed by evagination of muscular prostate ducts ... *T. montislewisi* (Jamieson, 1976) (part.)

14. (12b) a. Spermathecal diverticulum longer than ampulla plus duct. (Spermathecal pores in *d* lines) . . . *T. barrouensis* (Fletcher, 1886)
– b. Spermathecal diverticulum shorter than ampulla plus duct. (Spermathecal pores in *d–e* lines) *T. raveni* (Jamieson, 1976)
 15. (11b) a. Spermathecal pores immediately behind or in 5/6–7/8 *T. covacevichae* Jamieson, 1994
– b. Spermathecal pores in 6/7–8/9 16
 16. (15b) a. Male pores very close together, almost contiguous midventrally, on a common field or papilla . *T. athertonensis* (Michaelsen, 1916)
– b. Male pores well separated, between setal lines *a* and *f*, on a pair of papillae 17
 17. (16b) a. Spermathecal diverticulum simple, shortly clavate *T. caualiculatus* (Fletcher, 1887)
– b. Spermathecal diverticulum composite, consisting of as many as 4 parallel conjoined tubes with terminal, knoblike seminal chambers; approximately as long as spermatheca . *T. oculatus* (Jamieson, 1976)
 18. (10b) a. Spermathecal pores 2 pairs, in 4/5 and 5/6 or 5/6 and 6/7 19
– b. Spermathecal pores in 1 pair, in 6/7 or 7/8 or 8/9 21
- Spermathecal pores 2 pairs
19. (18a) a. Spermathecal pores 2 pairs, in 5/6 and 6/7 20
– b. Spermathecal pores 2 pairs, in 4/5 and 5/6 *T. windsori* Jamieson, 1995
– c. Spermathecal pores 2 pairs, in 7/8 and 8/9 *T. moritzi* Jamieson, 2000
 20. (19a) a. Male pores close together, in *b* lines . . . *T. montislewisi* (Jamieson, 1976) (part.)
– b. Male pores widely separated, in setal lines 3–4 relative to XIX . *T. leichhardti* sp. nov.
- Spermathecal pores 1 pair
21. (18b) a. Spermathecal pores 1 pair, in or shortly posterior to 8/9. Spermathecal diverticulum long and tortuous 22
– b. Spermathecal pores 1 pair, in 6/7 or 7/8 23
 22. (21a) a. Spermathecal pores in setal lines *c* to *d* *T. nashii* (Jamieson, 1976)
– b. Spermathecal pores in or median of setal lines *a* *T. liber* Jamieson, 1994
 23. (21b) a. Spermathecal pores 1 pair in 6/7 *T. crateris* (Jamieson, 1976)
– b. Spermathecal pores in 7/8 24
 24. (23b) a. Setal interval *ab* not narrower than other intervals. Nephridia with diverticulate bladders *T. ucilwraithii* Jamieson, 1997
– b. Setal interval *ab* narrower than other intervals. Nephridia lacking bladders *T. blounti* (Jamieson, 1976)

Terrisswalkerius leichhardti sp. nov.
(Figs 1A–C, 2A, B)

Etymology. Named after the explorer, Ludwig Leichhardt.

Material Examined. Holotype: Tinaroo Range, 17°05'34"S 145°35'13"E, altitude 1120 m, on ridge dividing headwaters of Kauri and Emerald Creeks catchments, both creeks flowing eventually into Barron River; 100 metres from Mt Haig-Kauri Creek road junction, complex notophyll vine forest in cloudy wet and moist uplands on Mareeba granite; clitellate specimen, PFA fixation, W1, B.G.M. Jamieson and K.R. McDonald, 25 Jan 2007, QM G231053.

Paratypes: Holotype locality. 100% EtOH or PFA fixation, B.G.M. Jamieson and K.R. McDonald, 25 Jan 2007, QM G231291–231293; Danbulla National Park, site 2, 17°05'34"S 145°35'15"E, Mt. Haig turnoff, Tinaroo Range, notophyll vine forest on granite hills, 5 specimens, two strongly clitellate, formalin/ethanol, K.R. McDonald, 27 Mar 2007, QM G231054–231058; Kauri Creek Road, 17°07'21"S 145°36'27"E, notophyll vine forest on granite PFA fixation, B.G.M. Jamieson and K.R. McDonald, 25 Jan 2007, QM G231294.

Diagnosis. See Remarks.

Description. Length 66–70 mm. Width (midclitellar) 3.6 mm (Holotype). Segments 120 (H). In alcohol (ex PFA) dorsally pigmented purplish brown with pale grey clitellum; in life with an almost black forebody. Prostomium (Fig. 1B) with form of very broad wedge only very slightly impinging on peristomium (slightly epilobous, closed), with conspicuous middorsal groove (canalicula) which extends to posterior limit of peristomium; faint midventral groove or at least

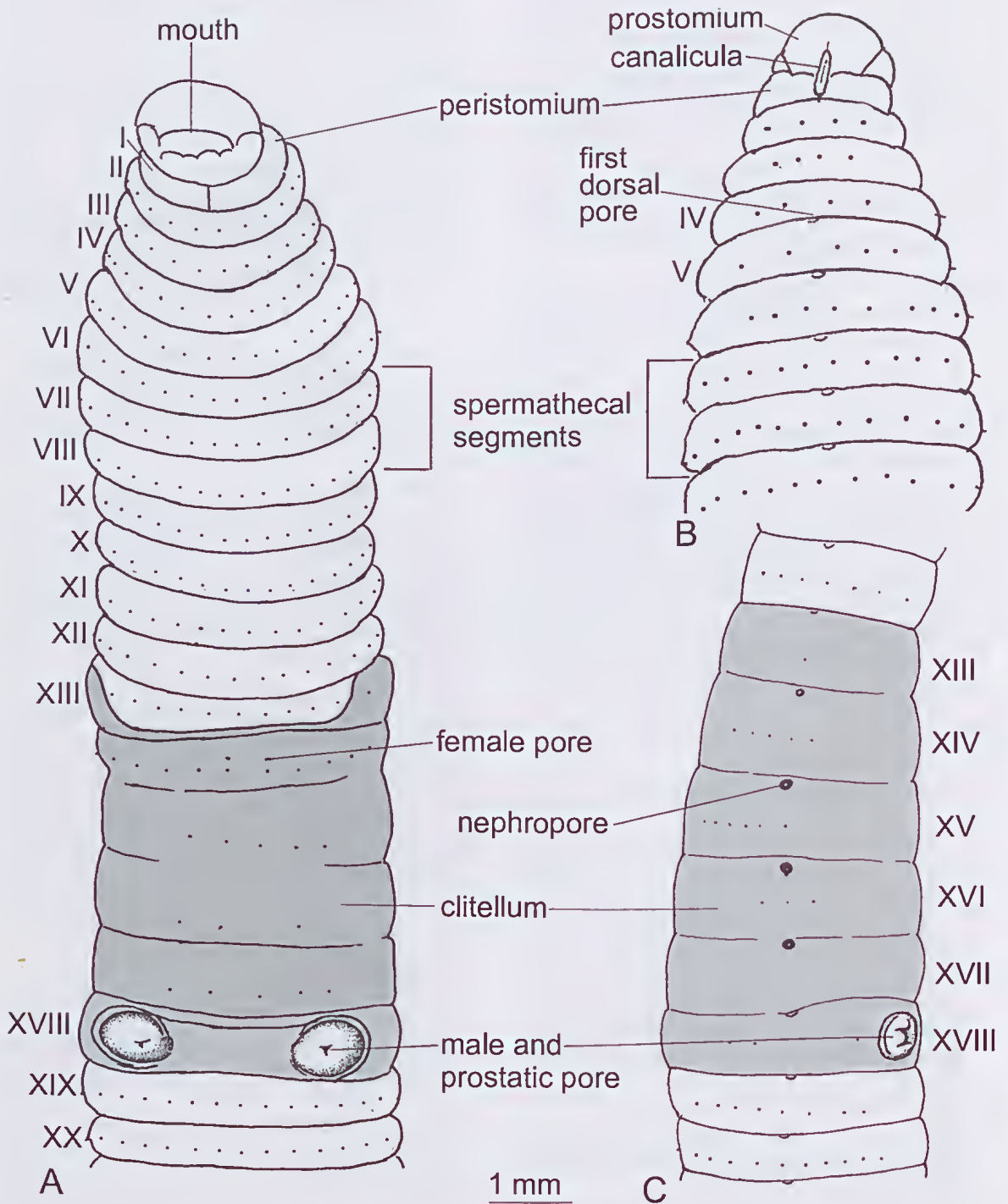


FIG. 1. *Terrisswalkerius leichhardtii* sp. nov. A, Ventral view of male genital field and forebody; B, Dorsal view of prostomium and anterior segments; C, Semi-lateral view, showing nephropores. Holotype QM G231053.

pigmented line throughout body; peristomium not appreciably shorter than first setigerous segment, bisected by midventral groove. First dorsal pore 4/5 (vestigial), 5/6 patent. Setae 26 in XII (H); closely and subequally spaced; *ca.* 0.26 mm apart; setae absent in XVIII between male pores; *a* lines becoming slightly irregular posteriorly; *z* lines irregular in forebody, more so in hind body; ventral and dorsal breaks not appreciable. Nephropores (Fig. 1C) in single, straight lateral series on each side, especially prominent, as dark orifices, on clitellum; in setal lines 7 preclitellar and 9 on clitellum.

Clitellum annular, dorsally XIII–XVIII (= 6 segments), but ventrally with a wide interruption in XIII. Male pores (Fig. 1A, C) in approximately setal lines 3 of XVIII relative to segment XVII or setal lines 3–4 relative to XIX, on very strongly protuberant domed papillae, each insunken at the pore, and with circumferential grooves; the pores 2.2 mm; 0.2 body circumference apart. Genital markings absent. Female pores not discernible with certainty, a pair shortly anterior to setae *a* of XIV. Spermathecal pores not visible externally; from internal examination, 2 pairs, in 5/6 and 6/7, in setal lines 6.

Septa 11/12–13/14 the strongest, moderately thickened. Last hearts in XII. Supraoesophageal vessel well developed. Gizzard large and firmly muscular, barrel-shaped with anterior rim, in VI(?), but its posterior end at level of 10/11. Intestinal origin XVII, with wide expansion.

Nephridia stomate, vesiculate holonephridia; a bladder examined in XXVI with a lateral diverticulum. Sperm funnels large and iridescent, in X and XI, embedded in flocculent (sperm?) masses; testis-sacs absent; seminal vesicles in IX and XII racemose, those in IX by far the larger; those in XII subspheroidal with tapering median portion, so as to appear club-shaped; a similar pair ("pseudovesicles" but probably functional) on anterior wall of XIII. Ovaries not discernible but oviducal funnels on posterior wall of XIII. Prostates (Fig. 2B) elongate racemose in appearance, in XVIII–XXII (right), –XXIII (left); incised by septa (tubuloracemose?); muscular duct long, sinuous, widening ectalwards but

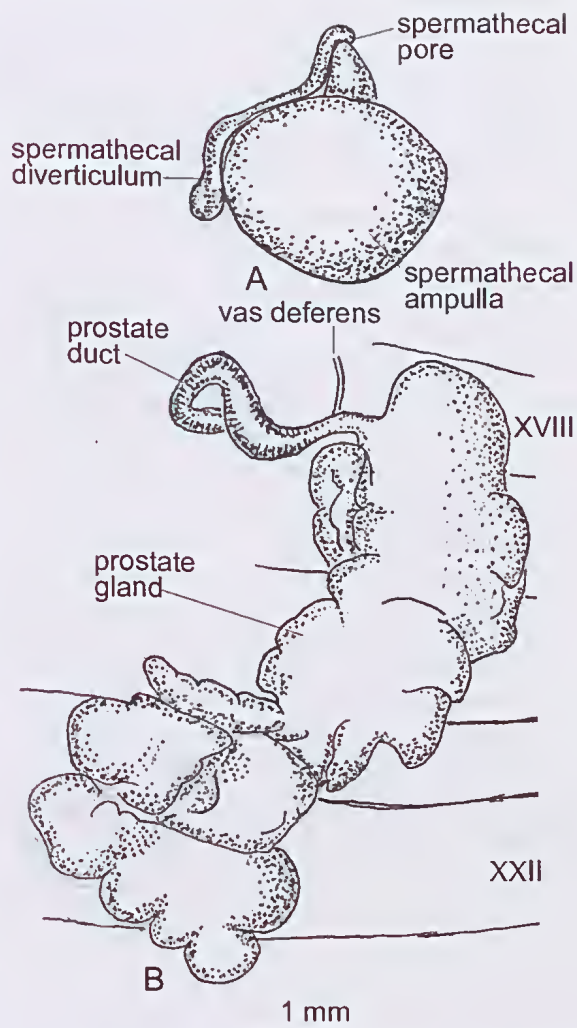


FIG. 2. *Terrisswalkerius leichhardti* sp. nov. A, Right posterior spermatheca, of VII; B, Right prostate. Holotype QM G231053.

widest at about midlength; joined ectal of gland by vas deferens; region of duct between this junction and gland with less muscular sheen than remaining more ectal, longer portion; ectal region coiled in circle over male porophore; tubuloracemose condition confirmed in further, acitellate material where prostates are thin and straplike, though with some low superficial nodules. Penial setae absent. Spermathecae (Fig. 2A), 2 pairs, opening anteriorly in VI and VII; ampulla spheroidal, duct slender, tapering to pore; diverticulum (inseminated)

single, clavate, uniloculate, with long sinuous duct uniting with spermathecal duct at body wall; size approximately uniform; length of right spermatheca of VII = 1.4 mm, ratio of total length: length duct = 2.5; ratio length: length diverticulum *ca.* = 0.9; length diverticulum = 1.5 mm.

Remarks. The species of *Terrisswalkerius* most closely resembling *T. leichhardtii* in general anatomy are those which, like it, have only two pairs of spermathecal pores, *viz.* *T. windsori*, (4/5 and 5/6), *T. moritzi* (7/8 and 8/9) and *T. montislewisi* (5/6 and 6/7 but usually in 4/5 also). Of these, *T. montislewisi* is the most similar but *T. leichhardtii* differs from it, *inter alia*, in the slightly epilobous not tanylobous prostomium; the smaller number of setae, having 26 as contrasted with 32–42 in XII; anterior extension of the clitellum onto XIII; the wider separation of the prostatic porophores and their pores; the more elongate, tubuloracemose, prostates; and the greater length of the spermathecal diverticulum relative to the ampulla.

Terrisswalkerius leichhardtii from the Danbulla site has been included as *T. sp.*, in a molecular analysis of earthworm phylogeny by James and Davidson (2012). It was the only representative of the genus. The GenBank accession numbers for this species are HQ728886 (18S), HQ728974 (28S) and JF267897 (16S).

Barcoding. DNA barcoding is the use of a standardised region of 658 bp of the mitochondrial gene cytochrome c oxidase I (COI) for species discrimination (Hebert *et al.*, 2003). This was performed at the Canadian Centre for DNA Barcoding using the BOLD platform and laboratory procedures (BOLD, <http://www.barcodinglife.org>; Ratnasingham & Hebert 2007). We used a specimen from the holotype locality and one from Danbulla. Additional sequences from the holotype locality are on the BOLD database and can be retrieved by using the sequences given here as queries.

EW-SJ-929 Jamieson BGM and McDonald K 25/1/07 Australia Queensland Tinaroo Range, near Mt. Haig-Kauri Creek road jct, in notophyll

vine cloud forest, 17°05'34"S 145°35'13"E (Holotype locality).

>EWSJA290-08 | EW-SJ-929 | *Terrisswalkerius leichhardtii*

CACACTATACTTCATTTTAGGTGTTTGAGCTG
GAATAGTTGGGGTTGGGATAAGACTCCTA
ATTCGAATTGAGCTGAGGCAGCCAGGTG
CATTCTTAGGGAGCGACCAACTATACAATA
CAATTGTGACAGCCCACGCTTTTCTAATA
ATTTCTTTTATGTTATGCCAGTATTTATTGGAG
GATTGGAAATTGATTATTACCACTTATATTA
GGGGCCCCGACATGGCATTCCCACGACTAAT
AATATAAGATTTTGACTCCTGCCGCCCT-
CACTAATCTTATTAGTATCCTCTGCTGCC
GTAGAAAAGGTGCTGGAACAGGGT-
GAACTGTCTATCCCCCTTAGCAA
GAAATATCGCCCATTTCTGGGCCCT
CAGTAGACTTAGCAATTTTTCTCTTCATT
TAGCAGGAGCCTCATCAATTTTGGGGGC
AATCAACTTTATTACCACAGTAATTAA-
CATACGATGATCGGGGTTACGACTAGAGC
GAGTCCCCCTATTTGTTTGAGCTGTGGTTAT
TACAGTAGTTTGCTGCTACTATCTCTCCCAGT
GCTTGCTGGGGCCATCACTATATTATTA
ACCGATCGCAATCTAAACACATCTTTTTTT
GACCCTGCAGGTGGGGGGGACCCAATTT
TATACCAGCACTTATT-

EW-SJ-903 McDonald K 27/3/07 Australia Queensland Danbulla National Park, Tinaroo Range, notophyll vine forest on granite hills, 17°05'34"S 145°35'15"E (Paratype locality).

>EWSJA264-08 | EW-SJ-903 | *Terrisswalkerius leichhardtii*

CACACTATACTTCATTTTAGGTGTTTGAGCTG
GAATAGTTGGGGTTGGGATAAGACTCCTA
ATTCGAATTGAGCTGAGGCAGCCAGGTG
CATTCTTAGGGAGCGACCAACTATACAATA
CAATTGTGACAGCCCACGCTTTTCTAATA
ATTTCTTTTATGTTATGCCAGTATTTATTGGAG
GATTGGAAATTGATTATTACCACTTATACTA
GGGGCCCCGACATGGCATTCCCACGACTA
AATAATATAAGATTTTGACTCCTGCCGCCCT
CACTAATCTTATTAGTATCCTCTGCTGCCG
TAGAAAAGGTGCTGGAACAGGGTGAAC
GTCTATCCCCCTTAGCAAGAAATATC
GCCCATTTCTGGGCCCTCAGTAGACTTA
GCAATTTTTCTCTTCATTAGCAGGAGCCT
CATCAATTTTGGGGGCAATCAACTTTATTAC
CACAGTAATTAACATACGATGATCGGGGT

TACGACTAGAGCGAGTCCCCCTATTTGTTT
GAGCTGTGGTTATTACAGTAGTTTGTCTGC
TACTATCTCTCCCAGTGCTTGCTGGGGCCAT
TACTATATTATTAACCGATCGCAATCTAAACA
CATCTTTTTTTGACCCTGCAGGTGGGGGGGACC
CAATTTTATACCAGCACTTATT-

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A new species of *Pseudotyrannochthonius* Beier (Pseudoscorpiones: Pseudotyrannochthoniidae) from the Warrumbungle Range, New South Wales

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ABSTRACT

A new species of the pseudoscorpion genus *Pseudotyrannochthonius* (family Pseudotyrannochthoniidae) is described from Warrumbungle Range in New South Wales based on morphological features of both males and females. *Pseudotyrannochthonius leichhardti* sp. nov. is the fourth described species from New South Wales and known only from the type locality. It represents the most inland record of any *Pseudotyrannochthonius* in Australia. □ false scorpion, Ludwig Leichhardt, pseudoscorpion, taxonomy, Warrumbungle National Park.

The Pseudotyrannochthoniidae are a family of medium-sized to large chthoniid pseudoscorpions (body length 1–3 mm) with 48 described species occurring on five continents across the Northern (Asia and USA) and Southern (Australia, Chile, Southern Africa) hemispheres (Harms & Harvey 2013; Harvey 2011; Harvey & Stáhlavský 2009). Only the nominate genus, *Pseudotyrannochthonius* Beier, occurs in Australia and 11 species have been described from mesic forests and caves in eastern Australia (8 species), southwestern Australia (1 species) and Tasmania (2 species) (Harms & Harvey 2013; Harvey 1985, 2011). All species are slender chthoniid pseudoscorpions with prominent chelicerae and a unique arrangement of the pedipalpal trichobothria. *Pseudotyrannochthonius* live in moist leaf litter, low vegetation and the topsoil layer, although the cave-dwelling species demonstrate a capacity to colonise subterranean habitats (Beier 1968, 1969, 1971; Chamberlin 1962; Dartnall 1970; Harms & Harvey 2013).

Despite the small number of described species, *Pseudotyrannochthonius* is widespread and represents the dominant pseudoscorpion

group in rainforests and wet sclerophyll forest communities across temperate Australia, with numerous new species awaiting formal description (Harms & Harvey 2013). The fauna of New South Wales is no exception and the only species currently described are *P. australiensis* Beier, 1966 from a single forest locality near Edith, plus two karst endemics: *P. eberhardi* Harms and Harvey, 2013 from the Stockyard Creek Karst and *P. jonesi* (Chamberlin, 1962) from the Jenolan Karst (Harvey 1985, 2011; Harms & Harvey 2013). Museum records, however, indicate a much wider distribution of *Pseudotyrannochthonius* in this state, with epigeal records representing many different putative species in most forest systems with a well-balanced supply of moisture (Fig. 1).

This paper has two aims: firstly to describe a new species of *Pseudotyrannochthonius* from the Warrumbungle National Park in the Orana region of New South Wales and present the first digital images of an epigeal species belonging to this genus. Secondly to establish the most inland record of *Pseudotyrannochthonius* in Australia: frontier country for a moisture-loving invertebrate lineage with a Gondwanan

heritage. I also report the distributional limits of this group on the world's driest inhabited continent.

In naming *Pseudotyranochthonius leichhardti* sp. nov., I wish to honour Ludwig Leichhardt, a man who loved to explore frontier country outback, pushed the limits of established knowledge, and offered scientific insights into wildlife and biodiversity at a time when Australia was largely *terra incognita*.

MATERIAL AND METHODS

All specimens examined are lodged at the Australian Museum Sydney (AMS). Terminology and measurements follow Chamberlin (1931), except for modifications to the nomenclature of the segments of the pedipalps and legs (Harvey 1992), the trichobothria (Edward & Harvey 2008; Harvey 1992) and chelal teeth morphology (Harvey 2009). The term 'rallum' is used for the cheliceral blades (Judson 2007) and the term 'coxal blades' (Harms & Harvey 2013) for the grooming organs on the first coxae. The abbreviation *dt* is used for the chelal duplex trichobothria in Pseudotyranochthoniidae rather than *xs* (Edward & Harvey 2008) to avoid homology implications amongst families in the absence of a phylogenetic framework for Chthonioidea.

Specimens used for morphological examination were preserved in c. 70–75% ethanol. General morphological examinations were carried out using a Leica MZ16A stereomicroscope and digital images were taken using a Leica DFC500 digital camera attached to a Leica MZ16A stereomicroscope, using the Leica Application Suite Version 3.6.0 software. This program allows the alignment of images taken at different focal planes (here 20–40 images, depending on size of the imaged structure) and combines them into a single image (Harms & Harvey 2013). Fine structures, such as the genital plates and coxal blades, were examined using an Olympus BH-2 compound microscope under 100–200 times magnification. For this purpose, specimens were immersed in 100% glycerol and temporarily mounted on microscope glass slides with 12 mm coverslips supported by

microneedles (diameter according to size of specimen). Glass genitalia microvials (BioQuip Products, Inc.) were used to store the dissected structures (Edward & Harvey 2008).

Line drawings were made on tracing paper using printed auto-montage images and rechecked against the respective structures to assure accuracy. In contrast to some recent taxonomic papers on chthonioid pseudoscorpions (Edward & Harvey 2008; Harvey 2009), only the external male genitalia are illustrated here because the internal genitalia appear to be of limited diagnostic value. All images were edited and formatted in Adobe Photoshop Version CS5 and distribution maps were produced using ESRI ArcGIS 9.3.1 software with improvements made in Adobe Photoshop Version CS5.

Measurements were taken with an ocular graticule at the highest possible magnification and are expressed in millimetres. All measurements were taken in dorsal view, except those of the coxae, trochanters and manducatory process that were taken in ventral view. Total length measurements of the body exclude the legs and chelicerae. Precipitation data for the Warrumbungle National Park are from the Office of Environment & Heritage, NSW National Parks & Wildlife Service (online at <http://www.environment.nsw.gov.au/NationalParks/>) and those for the surrounding areas from the Bureau of Meteorology, Melbourne, Australia (online at <http://www.bom.gov.au/>).

SYSTEMATICS

Family Pseudotyranochthoniidae Beier, 1932

Genus *Pseudotyranochthonius* Beier, 1930

Pseudotyranochthonius Beier, 1930: 207–208.

Tublichthonius Hoff, 1951: 10–11 (synonymised by Beier 1966, p. 285).

Spelaeochthonius Morikawa, 1954: 83–84 (synonymised by Muchmore 1967, p. 134).

Type species. *Chthonius* (*Chthonius*) *silvestrii* Ellingsen 1905, by original designation.

Diagnosis and description. See Harms & Harvey (2013).

Pseudotyrannochthonius leichhardti sp. nov.
(Figs 1–4)

Common name. Leichhardt's pseudoscorpion.

Etymology. The specific epithet is a patronym in honour of the naturalist and explorer Ludwig Leichhardt (1813–c. 1848) for his scientific legacy and contributions to Australian natural history.

Material. Holotype ♀: Australia, New South Wales, Warrumbungle National Park, Siding Springs Road, 0.9 km from Siding Spring Observatory, 31.16°15'S 149.04°31'E, 10–24 Nov 2001, c. 1060 m, pitfall traps, M.R. Gray, G.A. Milledge and H.M. Smith (AMS KS 75442). Paratypes: 1 ♀ (AMS KS 119839) and 1 ♂ (AMS KS 119840), same data as holotype.

Diagnosis. The species can be distinguished from *Pseudotyrannochthonius australiensis* Beier, 1966, the only other described epigean species from New South Wales, by details of the chelal fingers: both fingers strongly curved (slightly curved in *P. australiensis*), movable finger 4/5 as long as fixed finger (movable finger almost as long as fixed finger), movable finger with 9 broad teeth (5 acute teeth), fixed finger with 20 reclinate teeth (23 acute teeth), retrolateral side of chelal palm with c. 9 setae (c. 12 setae), trichobothrium *sb* shifted proximally and much further apart from *b* than *t* (*sb*, *b* and *t* spaced equally); tergal chaetotaxy 2: 4: 4: 4 (2: 4: 6: 6), cheliceral palm retrolateral with 5–6 setae (8 setae), and 11–12 coxal blades (9–10 blades).

Description. *Adult female* (holotype, AMS KS 75442). *Colour* (in ethanol): pedipalps, chelicerae and legs light brown, cephalothorax brown, chelal fingers and soft body parts pale yellow (Figs 2F, 3E).

Chelicerae (Figs 2H, I). Cuticle of palm squamate, with 5 acuminate setae, 1 lyrifissure in prolateral position to most dorsal row of setae on palm; movable finger with 1 seta in medial position, with 14 continuous serrations, medial serrations sharply pointed and proclinate, galea absent; fixed finger with 1 seta in subproximal position, 1 lyrifissure at the base, 2 large teeth situated medially and distally, 5 smaller teeth between large teeth, all teeth acuminate; rallum with 12 blades arising from a slit-shaped depression and distally increasing in size, proximal and distal blades not paired, other blades arranged

in pairs, all blades pinnate except anterior blade slightly serrate; serrula exterior with c. 20 visible blades, serrula interior with c. 16 blades.

Pedipalp (Figs 3E; 4A). All setae acuminate; trochanter 1.6, femur 6.9, patella 1.7, chela 4.6, palm 1.6 x longer than broad, fixed finger 1.9 x and movable finger 1.6 x longer than palm, without large basal apodeme, femur without tactile setae; chelal palm retrolateral with 9 setae, setae not arranged in rows; movable finger 0.8 x as long as fixed finger, both fingers strongly curved in lateral view, homodentate, distal sections of fingers strongly bent and crossing over in dorsal view, intercalary and accessory teeth absent, microsetae absent but distolateral setae at base of fixed finger short and thick, external and internal chelal condyles small and rounded, venom apparatus absent; fixed finger with 1 large lyrifissure at base, with 20 large and erect diastemodentate teeth, slightly reclinate, teeth largest medially and decreasing in size distally and proximally; movable finger with c. 9 strongly reclinate, broad and slightly juxtaedentate teeth in distal third, teeth proximally decreasing in size and forming a row of continuous reclinate serrations that extends towards base of finger; *trichobothria ib* and *isb* distally on dorsum of palm, fixed finger with 8 *trichobothria*, *esb*, *ist* and *eb* form an oblique row sublaterally to dorsally at base of fixed chelal finger, it and *est* in distomedial position and paired, it slightly more distal than *est*, *et* subdistal and duplex *trichobothria dt* distal, distance between *dt* and *et* c. 3 times diameter of *dt*, *dt trichobothria* shorter than other *trichobothria*; movable finger with 4 *trichobothria*, *st* situated sub-proximal and in medial position on finger, triplet *sb*, *b* and *t* distomedial to distal, distance between *sb* and *b* 5 times distance between *b* and *t*, *sb* in subventral position, *b* medial and *t* subdorsal.

Cephalothorax (Figs 2G; 3A, B). Subquadrate, 1.05 x longer than broad, without furrows, lateral margins constricted posteriorly; two pairs of eyes well developed and pigmented, posterior eyes less well defined than anterior eyes, eye region convex in dorsal view (Fig. 2G); with 20 setae arranged 8: 4: 4: 2: 2, postocular setae reclinate, preocular setae proclinate, interocular

setae situated at anterior margin of posterior eyes (Figs 3A,B); with 2 pairs of lyrifissures (Fig. 3B), first pair between anterior and ocular row of setae, second pair situated posterolateral to setae of posterior row, anterior pair larger than posterior pair; epistome convex, in a shallow groove, small but well sclerotised, strongly denticulate (Fig. 2A).

Abdomen (Figs 2D, E, F). Pleural membrane papillostriae, tergites and sternites undivided, setae uniserrate and acuminate; tergal chaetotaxy (Fig. 2E): 2: 4: 4: 4: 6: 6: 7: 5: 4: 4: 0 sternal chaetotaxy (Fig. 2D): 10: 12: 12: 10: 9: 9: 8: 6: 4: –: 2.

Genital region (Figs 2D; 3C). Genital opening slit-like, with 10 setae proximal to opening, arranged in two oblique rows 4: 4 plus a pair 1: 1 in medial position, all setae forming a subtriangular figure, two oblique lyrifissures present anterolateral to genital opening (Fig. 4C).

Coxae (Figs 3C, D). Manducatory process with 2 acuminate distal setae, apical seta straight, about 3 times longer than subapical seta and extending to about half of the rallum, subapical seta dwarfed and bent towards interior margin; pedipalpal coxa with 3 setae, two at distal margin and one more medial near interior margin, with 1 medial lyrifissure; coxae I with 11 terminally trifurcate coxal blades in an oblique row (Figs 2B; 3D), arranged in four distinct groups: 2: 2: 3: 4, blades that belong to a common group basally fused, distal blades largest and on a common palm-shaped, spatulate base; apical process of coxa I broadly rounded, total number of setae on coxae: I(3): II(4): III(5): IV(5) (Fig. 3D), each coxa with one small lyrifissure in distoapical position near margin; intercoxal tubercle pronounced and tear-drop shaped, bisetose (Fig. 3D).

Legs (Figs 2C, F; 3E). Heterotarsate; femora I and II longer than patellae I and II; femur and patella of leg IV 4.1 x longer than broad; metatarsi III and IV with two tactile setae in submedial position, tarsi III and IV with two tactile setae in subbasal and subterminal position; tarsus III with 3–4 terminal setae, tarsi IV and V terminally with 4–5 long setae; setae on femora I–IV: I(4), II(3), III(2), IV(2); subterminal tarsal setae not

distally serrate, arolium slightly shorter than claws and not divided, all claws simple.

Dimensions (in mm). Body length 2.40; pedipalps: trochanter 0.28/0.18, femur 0.97/0.14, patella 0.30/0.18, chela 1.37/0.30, palm length 0.47, fixed finger length 0.89, movable finger length 0.73; chelicera total 0.60/0.29, fixed finger length 0.26, movable finger length 0.33; cephalothorax 0.65/0.62 (anterior)/0.55 (posterior); leg I: femur 0.46/0.11; patella 0.52/0.09; tibia 0.34/0.08; tarsus 0.56/0.05; leg IV: femur 0.25/0.19; patella 0.53/0.19; tibia 0.54/0.12; metatarsus 0.31/0.90; tarsus 0.58/0.06.

Adult male (AMS KS 119840). As for female except as follows: *Chelicerae*: with 6 setae; movable finger with 15 continuous serrations; fixed finger with 4 large teeth, distal tooth largest.

Pedipalp (Fig. 4B). Trochanter 1.5, femur 6.14, patella 1.87, chela 4.95, palm 1.8 x longer than broad, movable finger 1.6 x longer than palm; palm 0.77 x as long as palm of female and more slender; fixed finger with 21 large and erect diastemodentate teeth; movable finger with 8 teeth in distal third.

Cephalothorax. 1.02 x longer than broad; epistome less pronounced than in female.

Abdomen. Sternal chaetotaxy 12: 26 [8+5]: 8: 10: 8: 8: 8: 6: 4: –: 2. **Genital region** (Fig. 4D): sternite II with 13–14 reclinate genital setae; sternite III with U-shaped genital opening and two valves, each genital valve with 8 proclinate valvular genital setae.

Coxae. Coxae I with 11–12 blades arranged in four distinct groups: 2: 2: 3(2): 5. **Legs**: setae on femora I–IV: I(4), II(3), III(2), IV(2).

Dimensions (in mm). Body length 1.80; pedipalps: trochanter 0.21/0.14, femur 0.86/0.14, patella 0.28/0.15, chela 1.14/0.23; fixed finger length 0.77; palm length 0.41; movable finger length 0.67; cephalothorax 0.55/0.54 (anterior)/0.45 (posterior); chelicera total 0.42/0.24, fixed finger length 0.18, movable finger length 0.23.

Distribution. Known only from the type locality in the Warrumbungle National Park (Fig. 1). Most species of *Pseudotyranochthonius*

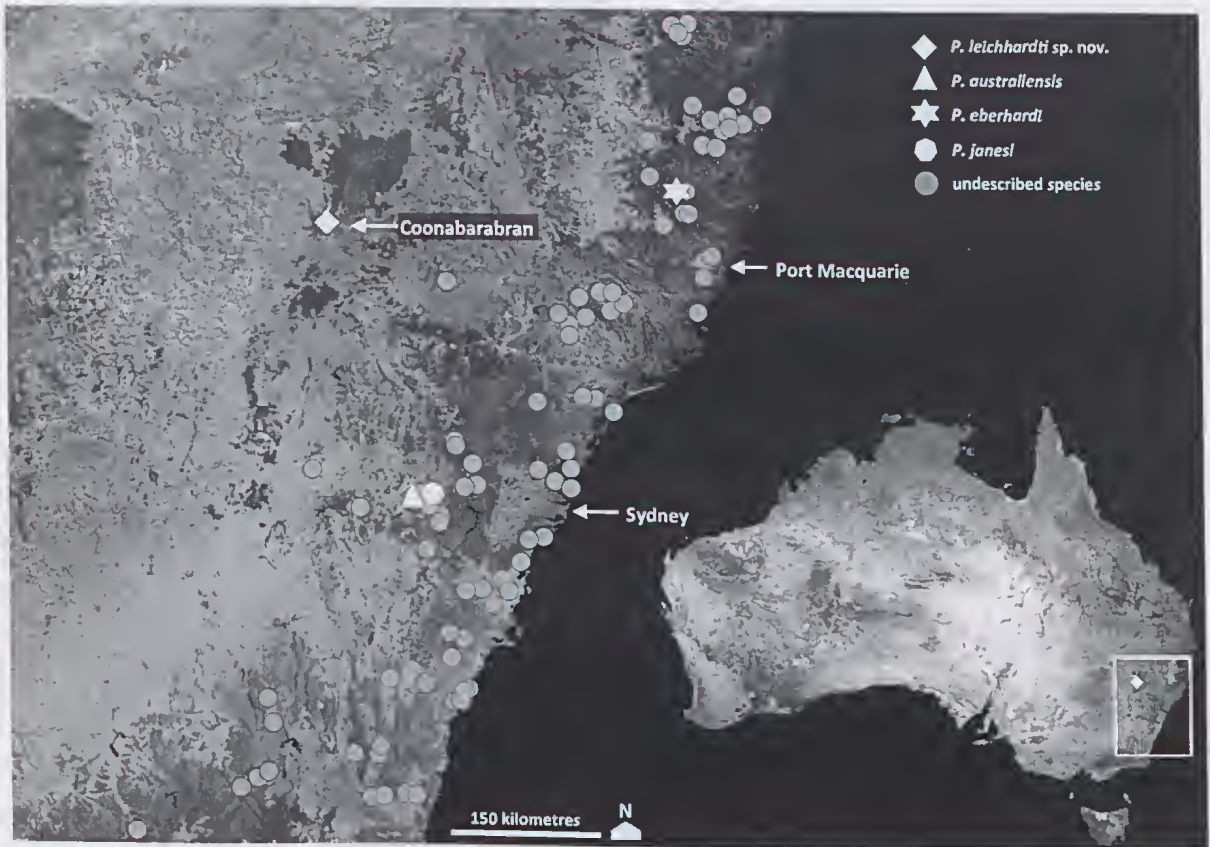


FIG. 1. Map showing locality of *Pseudotyrranochthonius leichhardti* sp. nov. plus records of described and putatively undescribed species occurring in New South Wales, Australia. The epigean records are based on a complete examination of specimens lodged with Australian museums.

in Australia are known from a single locality (Chamberlin 1962; Hoff 1951; Beier 1966, 1968; Dartnall 1970) or very few collecting sites (Mallick & Driessen 2005) only, and can be considered as short- or narrow-range endemics *sensu* Harvey (2002) and Ponder & Colgan (2002). Given this pattern, *P. leichhardti* sp. nov. is likely endemic to the Warrumbungle National Park.

Habitat and Climate. Tall sclerophyll forest in elevated terrain (G. Milledge, pers. com.). The Warrumbungle National Park has an annual average rainfall of 720 mm, with higher precipitation levels expected for the peaks of the Range. Rainfall decreases rapidly further inland (less than 600 mm for Cheddington weather station, c. 6 km west of the Range) and the occurrence of *Pseudotyrranochthonius*

there is unlikely. The specimens were collected in November when temperatures and rainfall increase following winter (June to August; driest month is September).

Conservation status. Unknown.

Remarks. *Pseudotyrranochthonius leichhardti* sp. nov. is one of many putative new species in New South Wales awaiting taxonomic description. Although the genus as a whole has not been revised, *P. leichhardti* sp. nov. can be easily diagnosed by means of its unique pedipalp morphology. I note, however, that most other putative species in New South Wales are morphologically less distinct and cryptic, so that a taxonomic approach based solely on morphology will fail. A combination of morphology and molecular tools, including multi-gene barcoding, linked

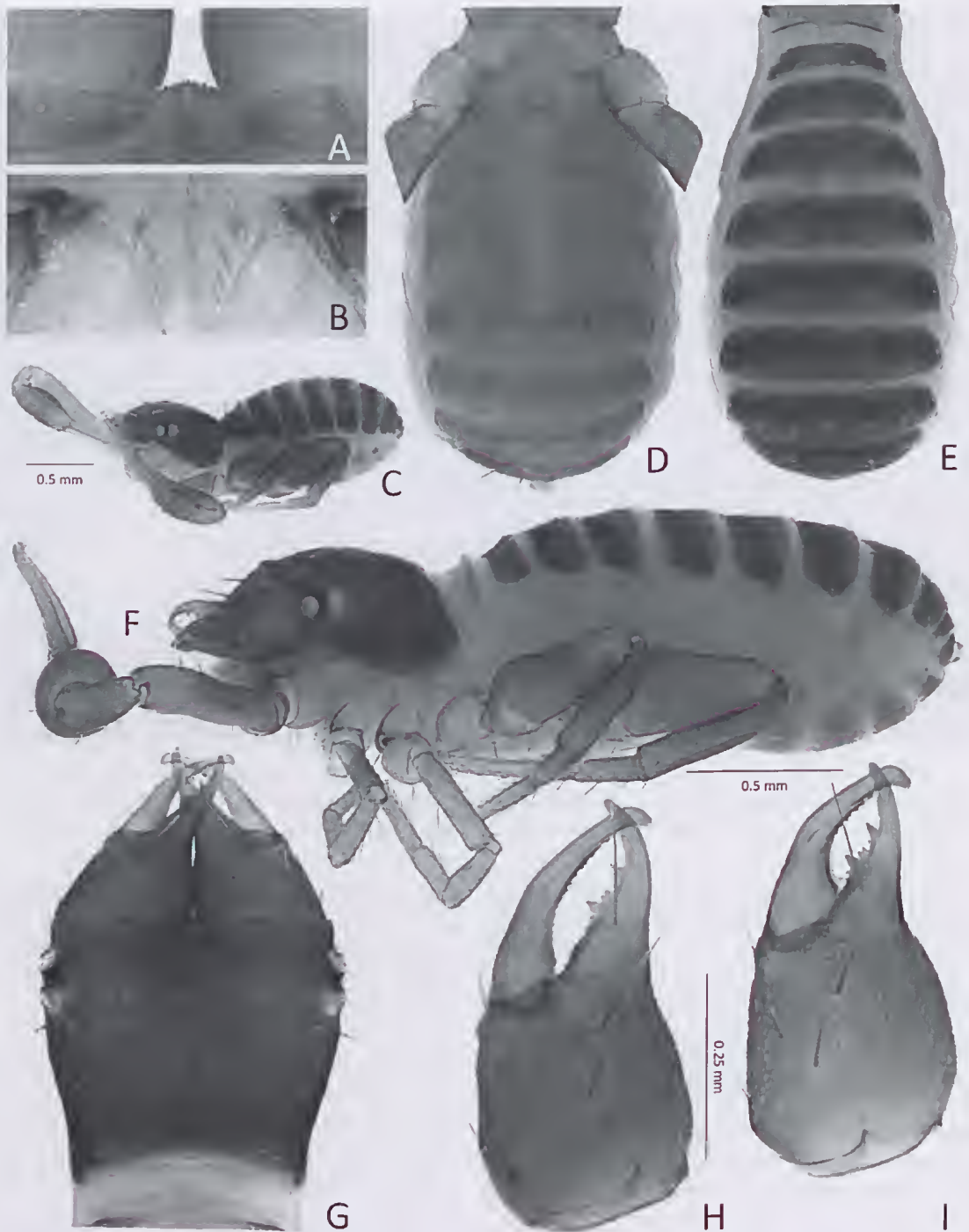


FIG. 2. *Pseudotyrannochthonius leichhardti* sp. nov., holotype female (AMS KS 75442, figs. A, B, D, E, F, G, H, I) and paratype male (AMS KS 119840, fig. C): A, epistome, dorsal; B, coxal blades, ventral; C, habitus, lateral; D, abdomen, ventral; E, same, dorsal; F, habitus, lateral; G, cephalothorax and chelicerae, dorsal; H, left chelicera, lateral; and I, same, ventrolateral.

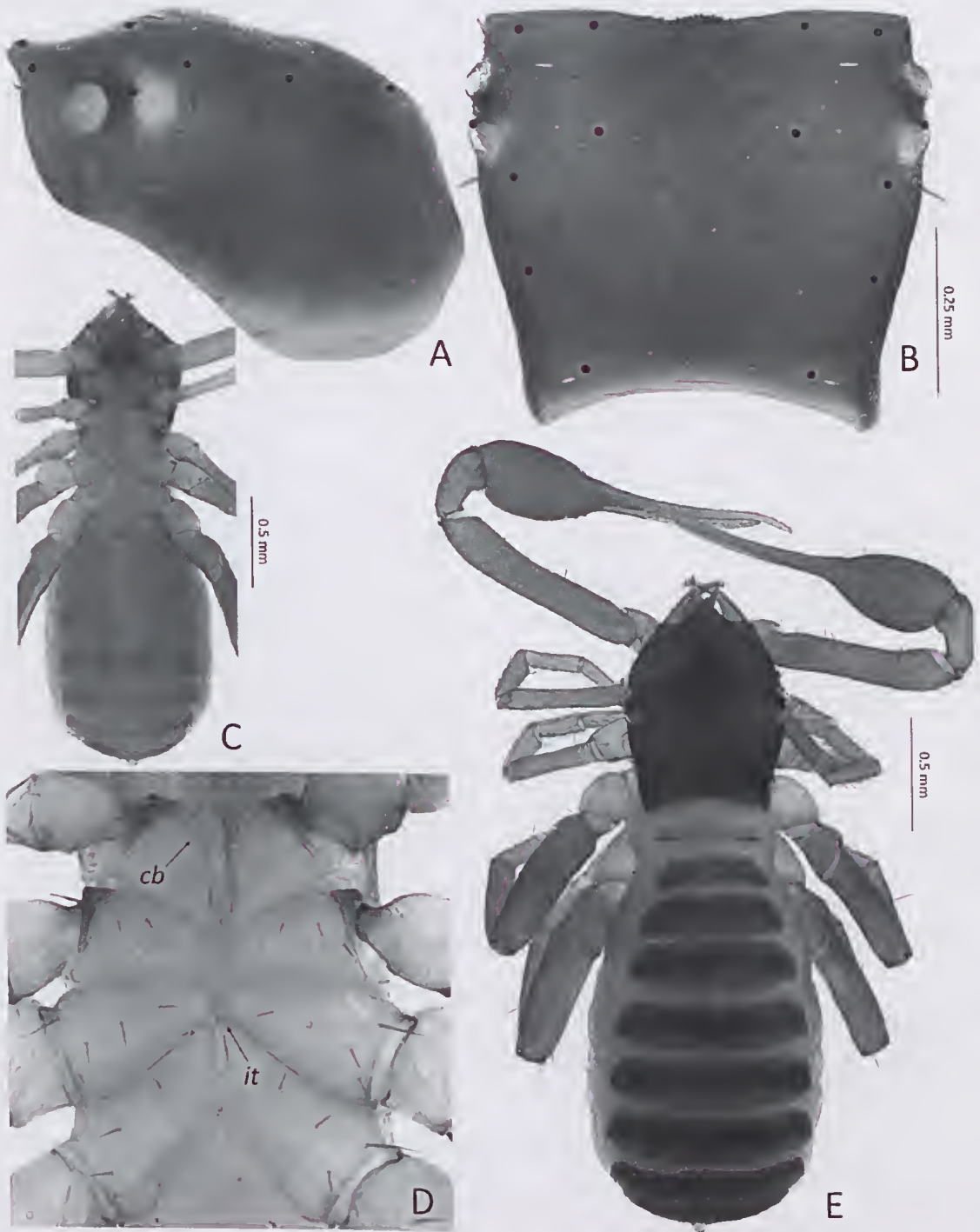


FIG. 3. *Pseudotyrannochthonius leichhardti* sp. nov., holotype female (AMS KS 75442): A, cephalothorax, lateral; B, same, dorsal (black circles refer to the position of setae, white dashes to position and orientation of lyrifissures); C, habitus, ventral; D, coxae, ventral; and E, habitus, dorsal. Abbreviations: *cb*, coxal blades; *it*, intercoxal tubercle.

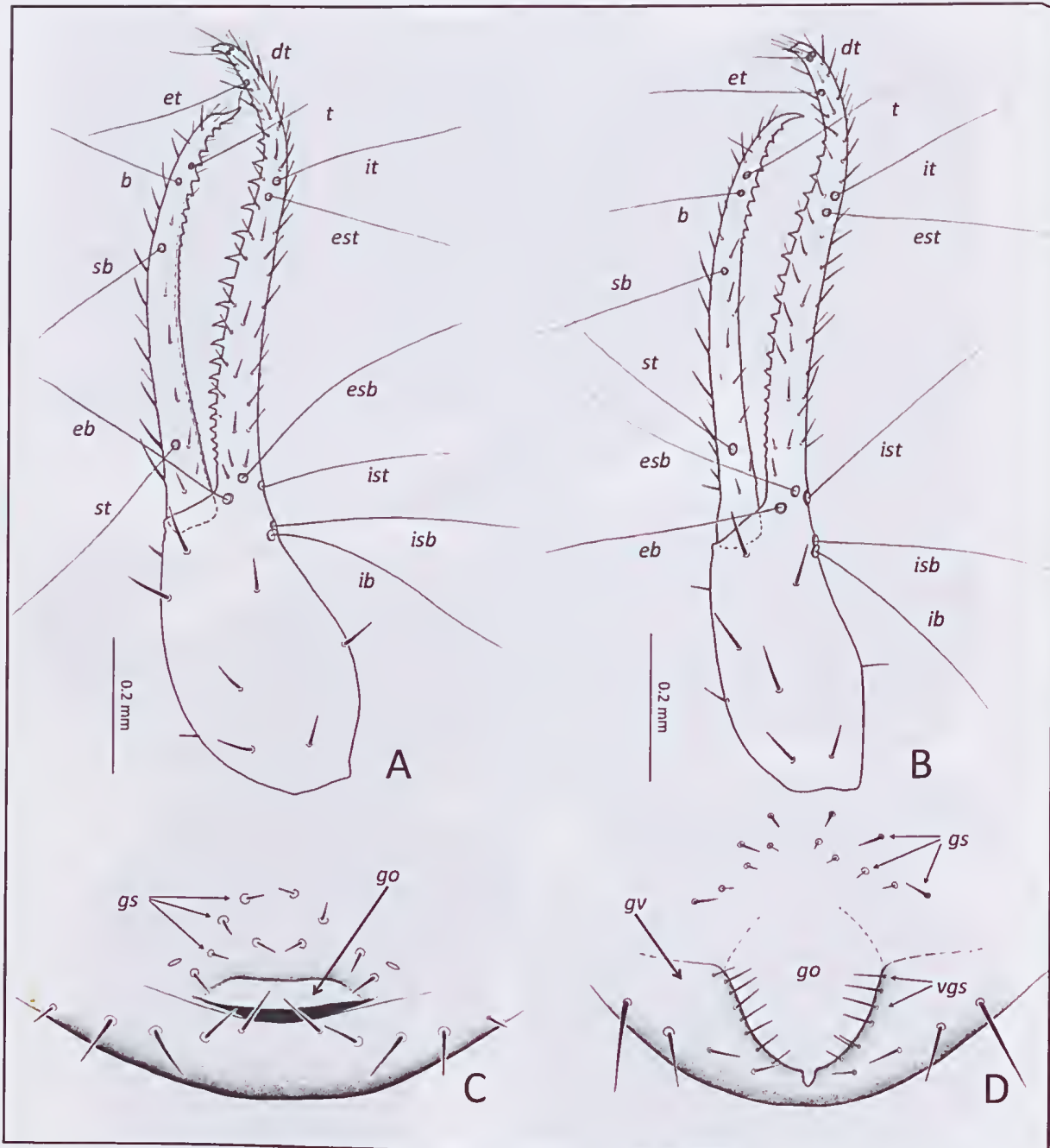


FIG. 4. *Pseudotyraunochthonius leichhardti* sp. nov., paratype female (AMS KS 119839): A, left chela and C, genital region; paratype male (AMS KS 119840): B, left chela and D, genital valves. Abbreviations: gs, genital seta; go, genital opening; gv, genital valve; vgs, valvular genital seta.

with increased spatial sampling will be necessary to establish a stable taxonomy. The following key is preliminary and allows the identification of described species only.

KEY TO DESCRIBED SPECIES OF *PSEUDOTYRANNOCHTHONIUS* FROM NEW SOUTH WALES

1. Without eyes. 2
– With eyes 3
2. Body length c. 3.6 mm; cephalothorax almost as broad as long, retrolateral side of chelicerae with 11 setae, with 12–14 coxal blades on coxa I and 5 setae on coxa II; from Stockyard Creek Karst (The Castles Nature Reserve). . *P. eberhardi* Harms & Harvey, 2013
– Body length c. 3.0 mm; cephalothorax significantly longer than broad, retrolateral side of chelicerae with 9 setae, with 9–11 coxal blades on coxa I and 4 setae on coxa II; from Jenolan Karst (Blue Mountains National Park) . . . *P. jonesi* (Chamberlin, 1962)
3. Body length c. 1.7 mm; movable chelal finger almost as long a fixed finger; fixed finger with c. 23 acute teeth, movable finger with 5 acute teeth distally, both fingers slightly curved; from SE Edith (Blue Mountains National Park area) *P. australiensis* Beier, 1966
– Body length 1.8–2.4 mm; movable chelal finger much shorter than fixed finger; fixed finger with c. 20 slightly reclinate teeth, movable finger with 9 reclinate teeth distally, both fingers strongly curved distally; from Warrumbungle National Park *P. leichhardti* sp. nov.

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A review of *Fedrizzia* mite species (Acari: Mesostigmata: Fedrizziidae) found in association with Australian *Mastachilus* beetles (Coleoptera: Passalidae)

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ABSTRACT

Mites of the genus *Fedrizzia* from passalid beetles of the genus *Mastachilus* are reviewed, and two new species, *Fedrizzia classeni* sp. nov. and *Fedrizzia humei* sp. nov. are described, both associated with *Mastachilus polyphyllus* (Macleay, 1826). *Fedrizzia oudemansi* Womersley, 1959, is redescribed and shown to occur only on the southern form of *Mastachilus australasicus* (Percheron, 1841); previous records of this mite from *M. polyphyllus* are placed in *F. classeni*. A revised key to *Fedrizzia* is presented. □ *Trigynaspida*, *Antennophorina*, host-associations, passalids, new species, key.

Fedrizziid mites are large, glossy brown mites that live with passalid beetles, a sub-social group of insects that live in family groups in rotting logs. Immature fedrizziid mites dwell in the beetle's tunnels where they are predators, most likely on nematodes (Seeman 2000). Once becoming adults, they move on to their host beetle where they remain closely associated for the rest of their adult life. Although they attend to their host closely, feeding from the host has never been observed. Instead, they presumably are opportunistic predators and scavengers, leaving the beetle to feed in close proximity. In the laboratory, adults fed on nematodes and used their long filamentous cheliceral excrescences to mop-up the fluids from dead microarthropods (Seeman 2000). Females deposited eggs on the substrate in the laboratory, and probably do the same in the tunnels of passalid beetles.

The Fedrizziidae includes 34 species in three genera: *Fedrizzia* (11 species) *Neofedrizzia* (22 species), and *Parafedrizzia* (1 species) (Womersley 1959; Seeman 2007, 2009). Each passalid beetle species is host to one to seven species of fedrizziid mites, with smaller host species tending to have fewer mite species (Table 1). Mite species can also differ in geographical

space. For example, *Pharochilus dilatatus* (Dalman, 1817) typically hosts the widespread species *Neofedrizzia camini* Womersley, 1959, but in the Bunya Mountains *P. dilatatus* is host to another species, *Neofedrizzia bunyas* Seeman, 2007, and *N. camini* is absent (Seeman 2007; Table 1). Consequently, the 34 species of Australian passalid beetles (Dibb 1938; Van Doesberg 1992) are likely to carry several times as many fedrizziid mite species. Add to this a multitude of other families of mites found on passalid beetles—12 in Australia, 25 world-wide—and it seems likely that Australian passalid beetles alone carry a startling number of undescribed species (Hunter 1993; Seeman 2001, 2002, 2007).

I here describe two new species of *Fedrizzia* from *Mastachilus polyphyllus* (Macleay, 1826), which hitherto had not been searched for fedrizziid mites. I also redescribe *Fedrizzia oudemansi* Womersley, 1959, which is found on the southern form of *Mastachilus australasicus* (Percheron, 1841).

MATERIALS AND METHODS

Mites were collected from the bottom of tubes containing beetles killed in 80% ethanol, or removed from pinned specimens. The mites

Table 1. Fedrizziid mites associated with Australian passalid beetles. Incidental records of mites that typically have other host beetles are not included (see Seeman 2007); passalid species that cannot be verified as hosts are not included. Host sizes from Dibb (1938) and specimens in the Queensland Museum.

Passalidae beetle species	Host size (mm)	Fedrizziidae mite species
Subfamily Passalinae		
<i>Analaches australiensis</i> ²	26–30	<i>Fedrizzia bornemisszai</i>
<i>Austropassalus hultgreni</i>	26–30	<i>Neofedrizzia lepas</i>
<i>Gonatus</i> sp. ²	20–33	<i>Fedrizzia bornemisszai</i>
<i>Mastachilus australasicus</i> (southern form)	38–42	<i>Fedrizzia abradoalves</i> <i>Fedrizzia oudemansi</i> <i>Fedrizzia parvipilus</i> <i>Fedrizzia sellnicki</i> <i>Neofedrizzia camini</i> <i>Neofedrizzia tragardhii</i> <i>Neofedrizzia vidua</i>
<i>Mastachilus australasicus</i> (northern form)	44–51	<i>Neofedrizzia brooksi</i> <i>Neofedrizzia helenae</i> <i>Neofedrizzia imparmentum</i>
<i>Mastachilus polyphyllus</i>	35–40	<i>Fedrizzia classeni</i> <i>Fedrizzia humei</i>
<i>Mastachilus quaestionis</i>	45–53	<i>Fedrizzia parvipilus</i> <i>Fedrizzia sellnicki</i> <i>Neofedrizzia bunyas</i> ¹ <i>Neofedrizzia camini</i> <i>Neofedrizzia vidua</i>
<i>Pharochilus dilatatus</i>	28–32	<i>Fedrizzia abradoalves</i> <i>Neofedrizzia camini</i> <i>Neofedrizzia cynota</i> ² <i>Neofedrizzia gorirossiae</i> ² <i>Neofedrizzia tragardhii</i>
<i>Pharochilus scutellonotus</i>	36–39	<i>Neofedrizzia camini</i> <i>Neofedrizzia tragardhii</i>
Subfamily Aulacocyclusinae		
<i>Aulacocyclus edentulus</i>	23–30	<i>Neofedrizzia canestrinii</i>
<i>Aulacocyclus fracticornis</i>	22–28	<i>Neofedrizzia canestrinii</i>
<i>Aulacocyclus kaupi</i>	27–29	<i>Neofedrizzia canestrinii</i>
<i>Aulacocyclus teres</i>	35–40	<i>Neofedrizzia jeffi</i> <i>Neofedrizzia susanae</i>

¹ *Neofedrizzia bunyas* replaces *N. camini* in the Bunya Mountains, SE Qld. ² Known from single record only.

were then cleared in Nesbitt's fluid, mounted in Hoyer's medium, dried, and ringed with insulating varnish. Host beetles were identified with Dibb (1938) and Seeman (2002). Measurements and illustrations were made with the aid of a Nikon Eclipse 80i microscope equipped

with DIC and a drawing tube. Morphology and setal designations follow those used in Seeman (2007). Measurements are in micrometres, and lengths and widths were measured at the longest or widest point of the relevant structure. Collection abbreviations are used for

the Queensland Museum, Brisbane (QM), the Australian National Insect Collection, Canberra (ANIC), and the South Australian Museum, Adelaide (SAMA).

SYSTEMATICS

Fedrizzia Canestrini, 1884

Fedrizzia Canestrini, 1884: 707; Seeman (2007: 15) [modern diagnosis]. Type species: *Fedrizzia grossipes* Canestrini, 1884, by monotypy. *Toxopeusia* Oudemans, 1927: 80. Type species not designated. Synonymy by Womersley (1959).

Fedrizzia classeni sp. nov.

(Figs 1–3)

Fedrizzia oudemansi — Seeman, 2007: 27 [only specimens from Rockwood].

Material examined. HOLOTYPE: QM-S95263, ♀, Barakula State Forest, southeast Queensland, 26°26'S 150°30'E, 10–16.x.2004, C. Burwell, Cypress forest (sampcode 52067), ex *Mastachilus polyphyllus* (Passalidae). PARATYPES: QM-S95264–6, ♀, 2 ♂♂, same data as holotype; QM-S74031–35, 3 ♀♀, 2 ♂♂, Rockwood, via Chinchilla, 1987, W. McKenzie, on passalid beetle; ANIC-51-006248, ♀, data as for holotype; ANIC-51-006249, ♂, data as for holotype.

Diagnosis. Both sexes: idiosoma length 725–810; dorsal shield with 3–6 larger pores medially; ventral shield with lineate reticulation laterally, smooth medially; ventrianal shield lineate-reticulate laterally and posteriorly, smooth anteromedially; marginal shield weakly lineate-reticulate; anterolateral corner of ventrianal shield not fused with ventral shield; exopodal patterning between CxII–III spotted; pedofossae III absent; CxIV-marginal suture absent; femur III and IV with small lamellae, seta *pv1* not significantly thickened; femur IV not elongated, larger than femur III; seta *h1* smooth, slightly curved. Female: *st2* length 5–8, *st3–4* length 11–15, lyrifissure *stp2* posterior to *stpx*; sternogynal shield with weak honeycomb-like reticulation internally, flanked by four pairs of pores and one pair of setae. Male: sternoventral shield without suture posterior to genital opening; genital opening flanked by one pair of pores; seta *h1* curved, flattened slightly; seta *h3* positioned posteromedial to *h2*.

Description. Female (n = 6). *Idiosoma* (Fig. 1A) length 725–810, width 540–610 (holotype 785 × 570). *Dorsum*. Dorsal shield with anterior

hyaline projection bearing one pair of barbed setae, length 61–63; hypertrichous, with *c.* 230–260 minute setae; with numerous (*c.* 80) smaller pores and 3–6 larger medial pores (subcuticular gland 6–10 diameter); with sub-lateral line of 36 pores; dorsal patterning comprises fine transverse to oblique lines and incomplete reticulation; marginal setae length 6. *Venter*. Tritosternum base length 26–27, width 34–39 (Fig. 1B). Presternal and sternal shield smooth; presternal shield rectangular, length 30–32 at midline, width 87–95; *st1* barbed, length 35–40; *st2* barbed, length *c.* 55; *st3* with few barbs, length 15, *st4* with 1–2 barbs, length 11–15; posterolateral margin of sternal shield pointed, *st3–4* 4–8 anterior to posterior margin, pore *stpx* anterior to *stp2*. Sternogynal shield length 118–125, width 140–156, with weak internal honeycomb-like reticulation, not surrounded by smooth area; shield flanked by four pairs of pores and one pair of setae. Ventral shield lineate laterally, smooth medially, a large pore medially between CxIII–IV, without pore posteromedial CxIV, two pairs of large pores, *c.* 7–8 pairs of small round pores, 10 pairs of setae, the most posterior and lateral length 8–12. Ventrianal shield length 165–175, width 435–465, fine lineate network of reticulation laterally and posteriorly, smooth anteromedially, two pairs of setae anterior to anus, three lateral pairs length 12–16, paranal setae length 32–34; anterolateral corner of ventrianal shield not fused with ventral shield. Marginal shields with lineate reticulation.

Legs. TrI with seta *pv1* with minute barbs, not thicker than seta *av1*. FeI with seta *pv3* similar to seta *pv1* and *pv2*. FeII with lamella distal to seta *pv1*, seta *ad1* smooth, thickened. FeIII with small lamella, seta *pv1* not spine-like. FeIV similar to FeIII, not elongated, length 95–100, width 74–80 at distal end, with small lamella, seta *pv1* not spine-like, seta *pd2* just proximal to seta *ad2* (Fig. 2A). TaII with seta *av2* spine-like, subequal in length to *av3*; Ta III with seta *av2* thickened, subequal in length to seta *av3*. Legs II–IV with thin, setiform *ad* and *pd* setae.

Gnathosoma (Figs 2B–E). Seta *h1* smooth, slightly curved, length 43–47, distance between *h1–h1* 20–24; *h2* barbed length 28–36; *h3* length 6–8, posterolaterad *h2*; palpcoxal seta length 11–14. Corniculi on tubercles, tubercle length

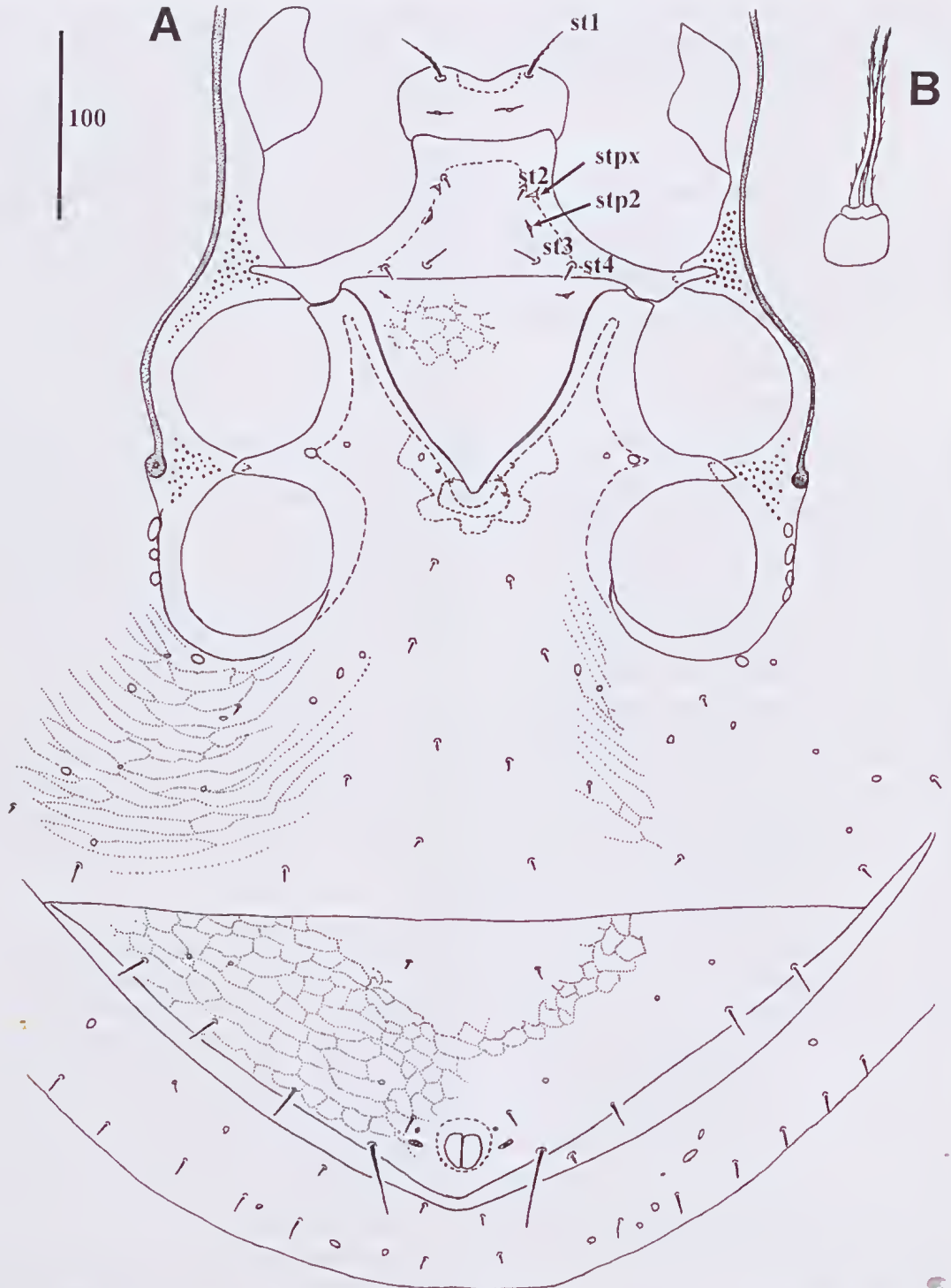


FIG. 1. *Fedrizzia classeni* sp. nov. Female: A, venter. B, tritosternum. Reticulation shown completely only on left-hand side of illustration.

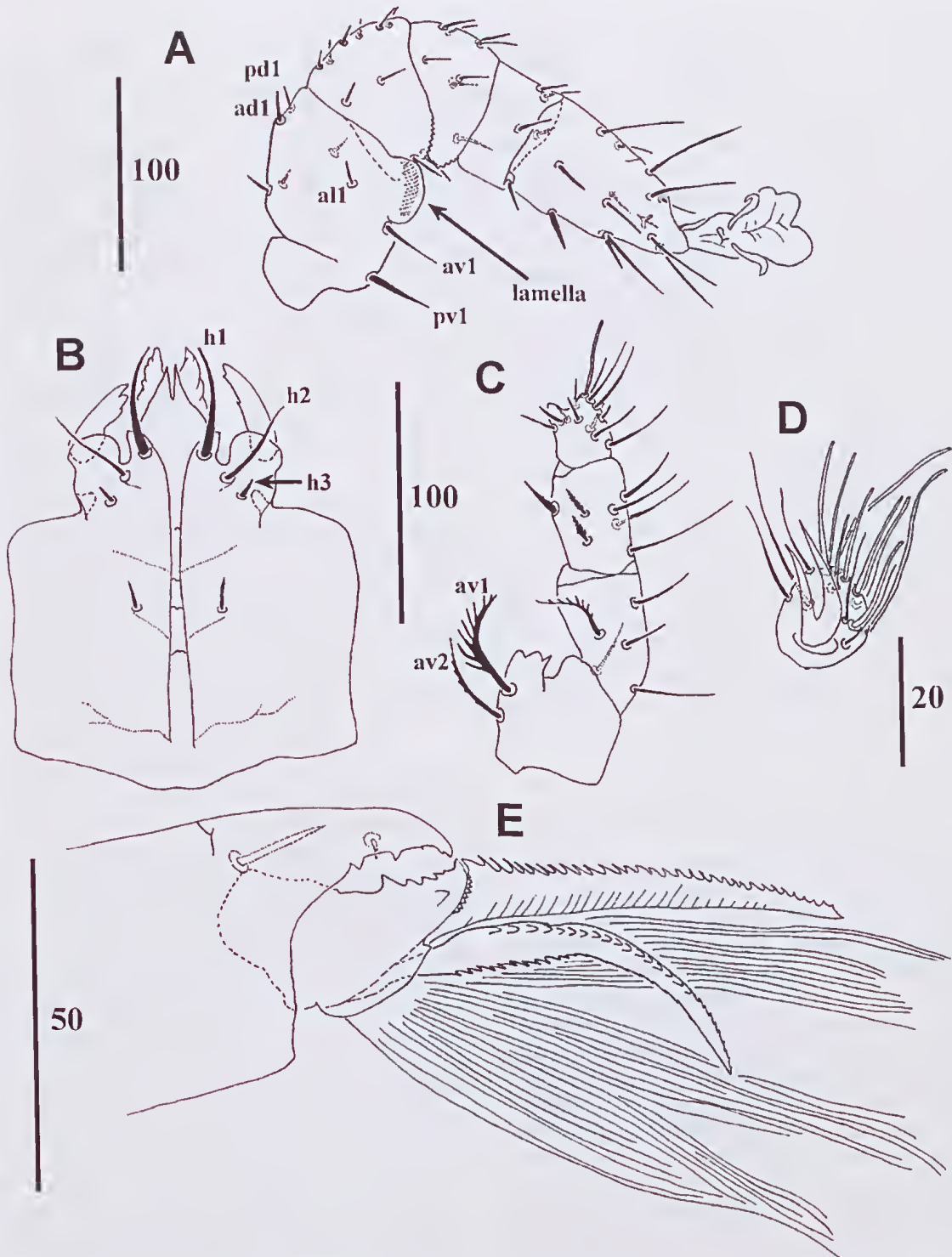


FIG. 2. *Fedrizzia classeni* sp. nov. Female: A, leg IV, right-hand side anterior view; femoral setae partially labelled, lamella indicated. B, hypostome. C, palp trochanter-tibia. D, palp tarsus. E, chelicera.

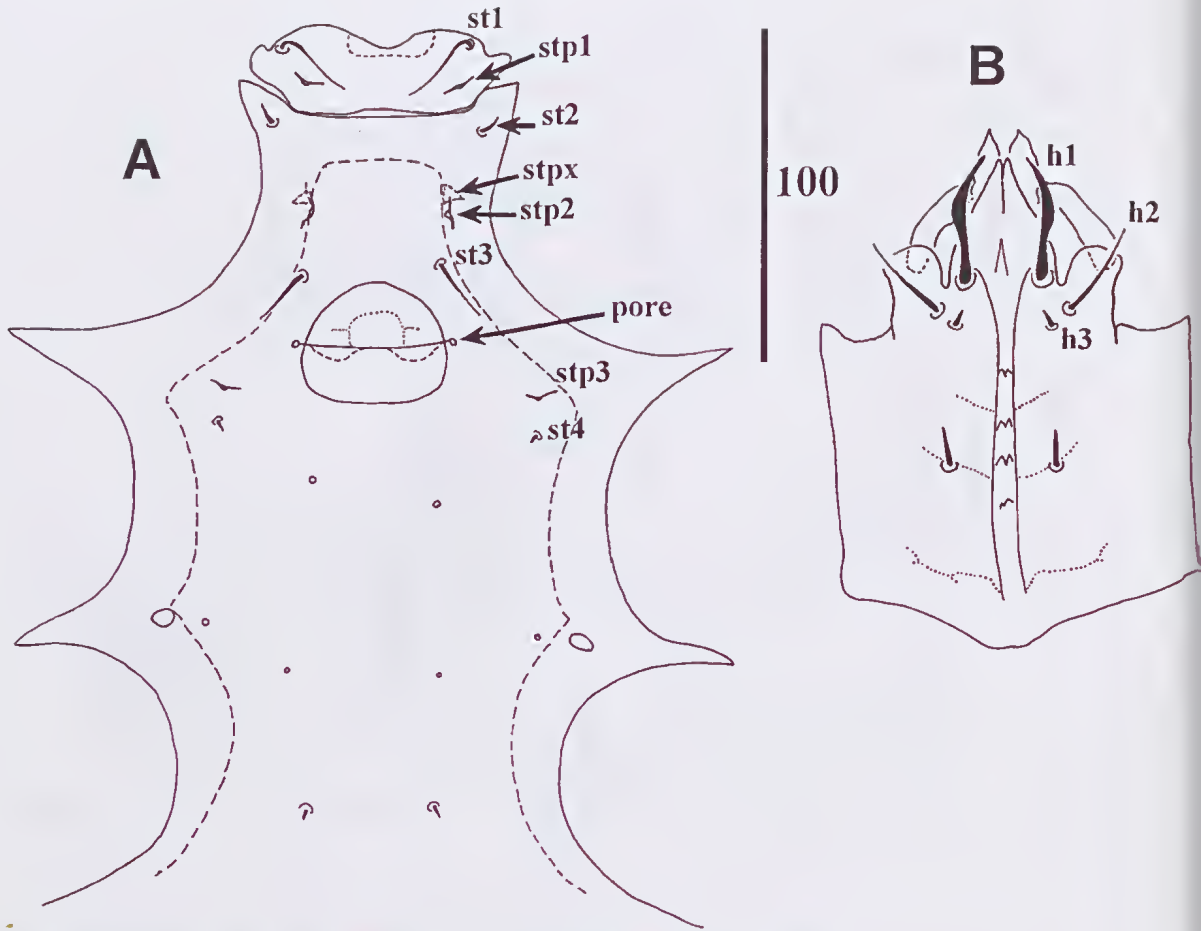


FIG. 3. *Fedrizzia classeni* sp. nov. Male: A, sternoventral shield. B, hypostome.

14; corniculi palmate, tip toothed. Palp, seta *av1* on trochanter with 8–9 branches, seta *av2* barbed, spur with one sharp and two blunt processes (Figs 2C–D). Chelicera, fixed digit length 140, movable digit length 42, fixed digit with two large and two minute teeth; excrescences arise from an enlarged base of digit and comprise a large brush-like process, a ribbon-like process with a serrate edge, and a ribbon-like process with a crenate and toothed edge; processes extend at least 55 past end of chelicerae (Fig. 2E).

Male ($n = 5$). *Idiosoma* length 700–770, width 505–545. Presternal shield length 20–23 at midline, width 78–90; *st1* barbed, length 27–30; *st2* smooth, length 5; *st3* smooth, length 10–12. Genital opening length 39–41, width 48–50. Suture posterior to genital opening absent (Fig.

3A). *Gnathosoma*. Seta *h3* length 6, just anterior to *h2* and closer to midline than *h2*. Seta *h1* broadened, curved, length 38–42 (Fig. 3B).

Etymology. This species is named for Adolph Classen, who was second-in-charge during Leichhardt's final expedition, but may have survived and lived out his life with the aboriginal people of central Australia.

Remarks. *Fedrizzia classeni* sp. nov. resembles *F. oudemansi* in its size, setae and shield ornamentation. However, it bears a small lamella on femur III and IV, a characteristic found only, amongst *Fedrizzia*, in *Fedrizzia gilloglyi* Seeman, 2007, from Thailand. *Fedrizzia gilloglyi* is much larger (length 1140–1160) than *F. classeni* sp. nov. (length 700–810) and lacks pores flanking the sternogynal shield (4 pairs in *F. classeni*).

Fedrizzia humei sp. nov.

(Figs 4–6)

Material examined. HOLOTYPE: QM-S95267, ♀, Barakula State Forest, southeast Queensland, 26°26'S 150°30'E, 10–16.x.2004, C. Burwell, Cyprus forest (samcode 52067), ex *Mastachilus polyphyllus* (Passalidae). PARATYPES: QM-S95268–9, ♀, ♂, same data as holotype; ANIC-51-00625, ♂, same data as holotype.

Diagnosis. Both sexes: idiosoma length 860; dorsal shield with eight large pores; ventral shield with mesh-like pattern; marginal and ventrianal shields with mesh-like pattern; anterolateral corner of ventrianal shield fused with ventral shield; exopodal patterning between CxII–III spotted; pedofossae III absent; CxIV-marginal suture absent; femur III and IV without lamellae, seta *pv1* not significantly thickened; femur IV elongated; seta *h1* unmodified. Female: *st2* length 28, *st3* length 49–52, *st4* length 16; lyrifissure *stp2* anterior of *stpx*; sternogynal shield with honeycomb-like reticulation anteriorly, densely punctate posteriorly, flanked by 6–7 setae and 21 pores, surrounded by a smooth area extending 35 posterior of sternogynal shield. Male: sternoventral shield with suture posterior to genital opening demarking anterior smooth and posterior reticulated areas; genital opening not flanked by pores; seta *h3* positioned level with *h2*.

Description. Female (*n* = 2): *Idiosoma* (Fig. 4) length 860, width 675–680. *Dorsum.* Dorsal shield with anterior hyaline projection bearing one pair of barbed setae, length 56–61; hypertrichous, with c. 210–230 minute setae; with numerous (c. 220) smaller pores and 8 larger medial pores (subcuticular gland 10–15 diameter); with sublateral line of c. 100 pores; dorsal patterning comprises transverse to oblique lines and extensive punctations; marginal setae length 8–12. *Venter.* Tritosternal base length 35, width 45 (Fig. 4B). Presternal and sternal shield with fine mesh-like reticulation arranged in larger polygons; presternal shield rectangular, length 31–33 at midline, width 121–127; *st1* smooth, length c. 20; *st2* length 28, *st3* length 49–52, *st4* length 16, *st2*–4 lightly barbed; posterolateral margin of sternal shield acutely pointed, *st3*–4 2–7 anterior to posterior margin, pore *stpx* posterior to *stp2*. Sternogynal shield length 100–103, width 160–166, with honeycomb-like reticulation anteriorly, otherwise

densely punctate. Sternogynal shield surrounded by smooth area that extends 35 posterior of sternogynal shield; patch of smooth cuticle 40–45 diameter medially at posterior level of CxIV; remainder of ventral shield with mesh-like pattern. Sternogynal shield flanked by 6–7 setae (length 8–15) and 21 pores. Ventral shield with large pore (8 diameter) posteromedial of CxIV, four pairs of pores laterad CxIV, c. 16 pairs of small round pores, 10 pairs of setae, length of most posterior and lateral 10–12. Ventrianal shield length 115–120, width 375–390, with mesh-like reticulation anteriorly, becoming lineate-reticulate posteriorly, one pair setae just anterior of anus (length 6) (anteromedial ventrianal seta absent), three lateral pairs (length 10–20), paranal setae length 20; anterolateral corner of ventrianal shield fused with ventral shield. Marginal shields with mesh-like to lineate reticulation (Fig. 4A).

Legs. TrI with seta *pv1* with minute barbs, not thicker than seta *av1*. FeI with seta *pv3* similar to seta *pv1* and *pv2*. FeII with lamella distal to seta *pv1*, seta *ad1* smooth and thickened. FeIII without lamella, seta *pv1* not spine-like. FeIV enlarged (Fig. 5A), length 240–260, width 125–130 at distal end, without lamella, seta *pv1* not spine-like, seta *pd2* more proximal than seta *ad2*. Tall and III with seta *av2* setiform, longer than seta *av3*; Tall *av2* barbed. Tall III *av3* smooth. Legs II–IV with slightly thickened *ad* and *pd* setae, especially on femora and genua.

Gnathosoma (Fig. 5B). Seta *h1* smooth, straight, length 68–74, distance between *h1*–*h1* 38–40; *h2* smooth, length 44–55; *h3* length 7, posterolaterad *h2*; palpcoxal seta length 12. Corniculi on tubercles, tubercle length 10; corniculi palmate, tip toothed. Palp, seta *av1* on trochanter with 8–9 branches, seta *av2* with small barbs, spur with small denticles and blunt process. Chelicera, fixed digit length 175–180, movable digit length 63, fixed digit with two large and two minute teeth; excrescences arise from an enlarged base of digit and comprise a large brush-like process, a ribbon-like process with a serrate edge, and a ribbon-like process with a crenate and toothed edge; processes curled in specimens, but extend c. 75 past end of chelicerae.

Male (*n* = 2): *Idiosoma* length 930, width 695. Presternal shield length 29–32 at midline, width

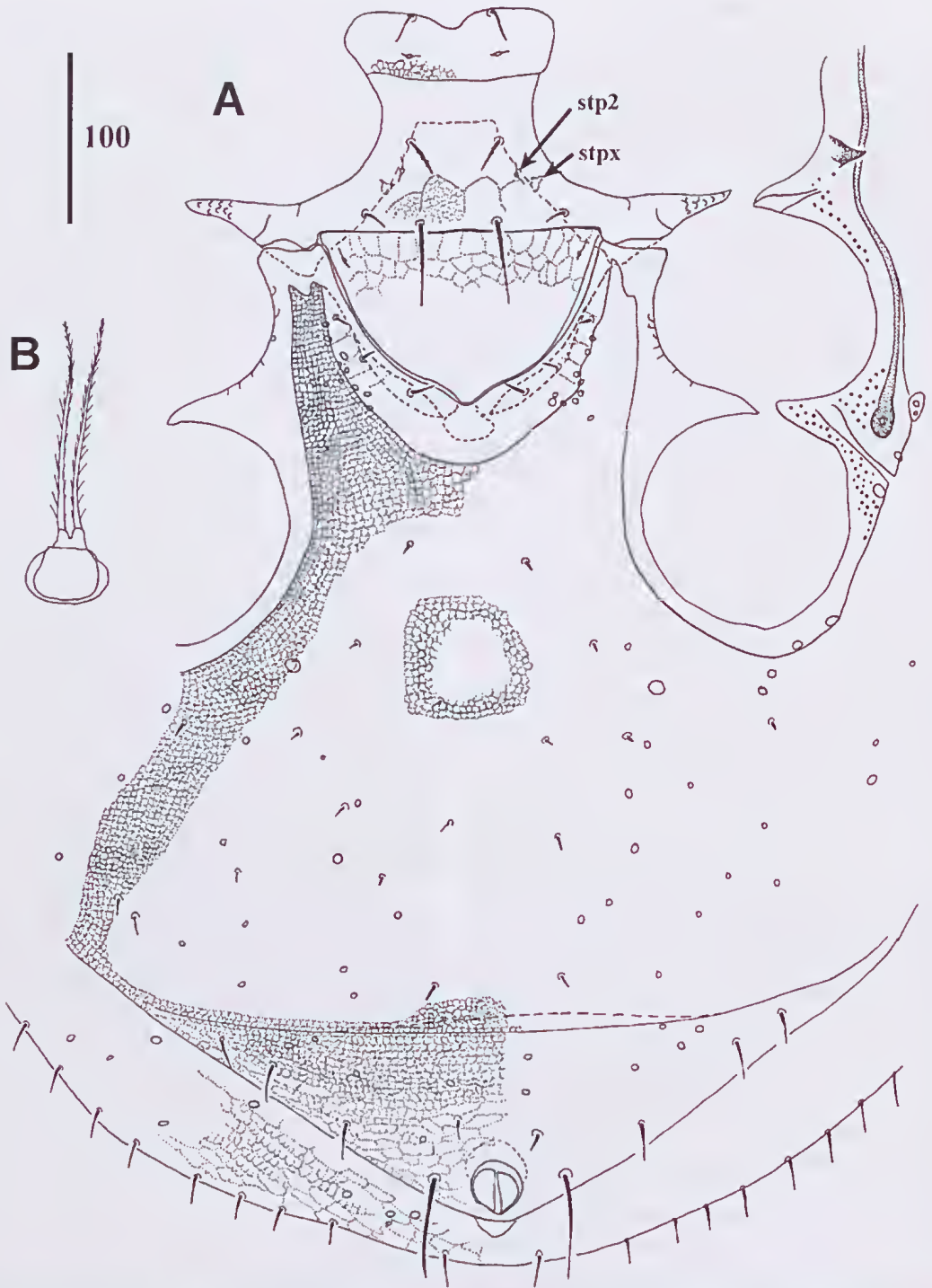


FIG. 4. *Fedrizzia humei* sp. nov. Female: A, venter; reticulation shown completely on presternal, sternal and ventrianal shields only on left-hand side; extensive reticulation shown incompletely on ventral shield to show setae, but central patch is smooth. B, tritosternum.

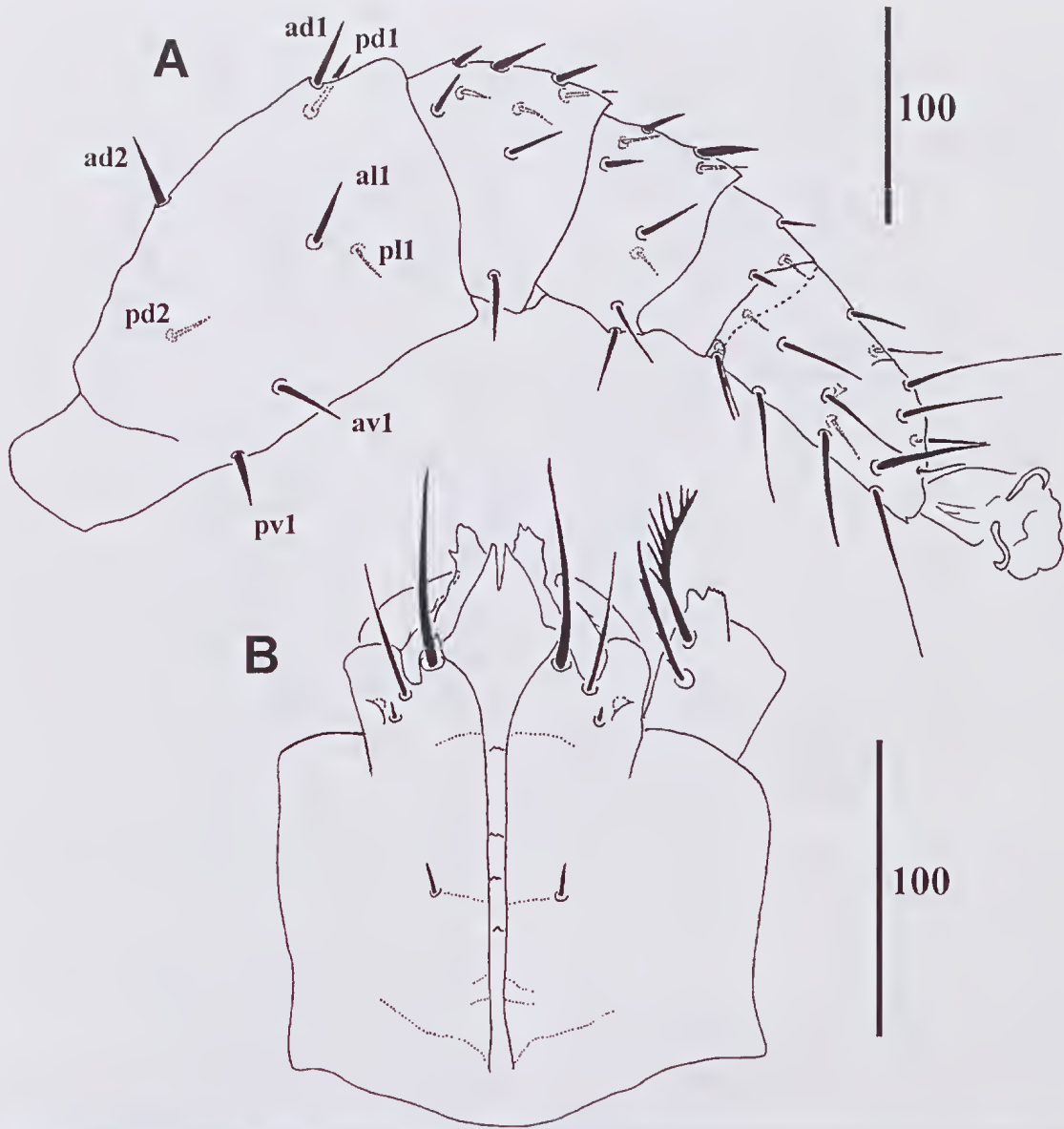


FIG. 5. *Fedrizzia humei* sp. nov. Female: A, leg IV, right-hand side anterior view; femoral setae labelled. B, hypostome and palp trochanter.

88–94; *st1* smooth, length 35–45; *st2* smooth, length *c.* 6; *st3* smooth, length 20. Genital opening length 58–61, width 68–71. Small, medial smooth area medially, *c.* 50 diameter, at level of posterior margin of Cx IV. Suture posterior to genital opening separates smooth sternogenital shield from ventral shield. Ventral, ventrianal and marginal shields with mesh-like reticulation (Fig. 6A). *Gnathosoma*.

Seta *h3* length 10–12, and level with *h2* and closer to midline than *h2*. Palpcoxal seta length 13 (Fig. 6B).

Etymology. This species is named for Andrew Hume, who probably met Adolph Classen after Ludwig Leichhardt's final expedition failed. Andrew Hume died during his second attempt to relocate the man he thought was Adolph Classen.

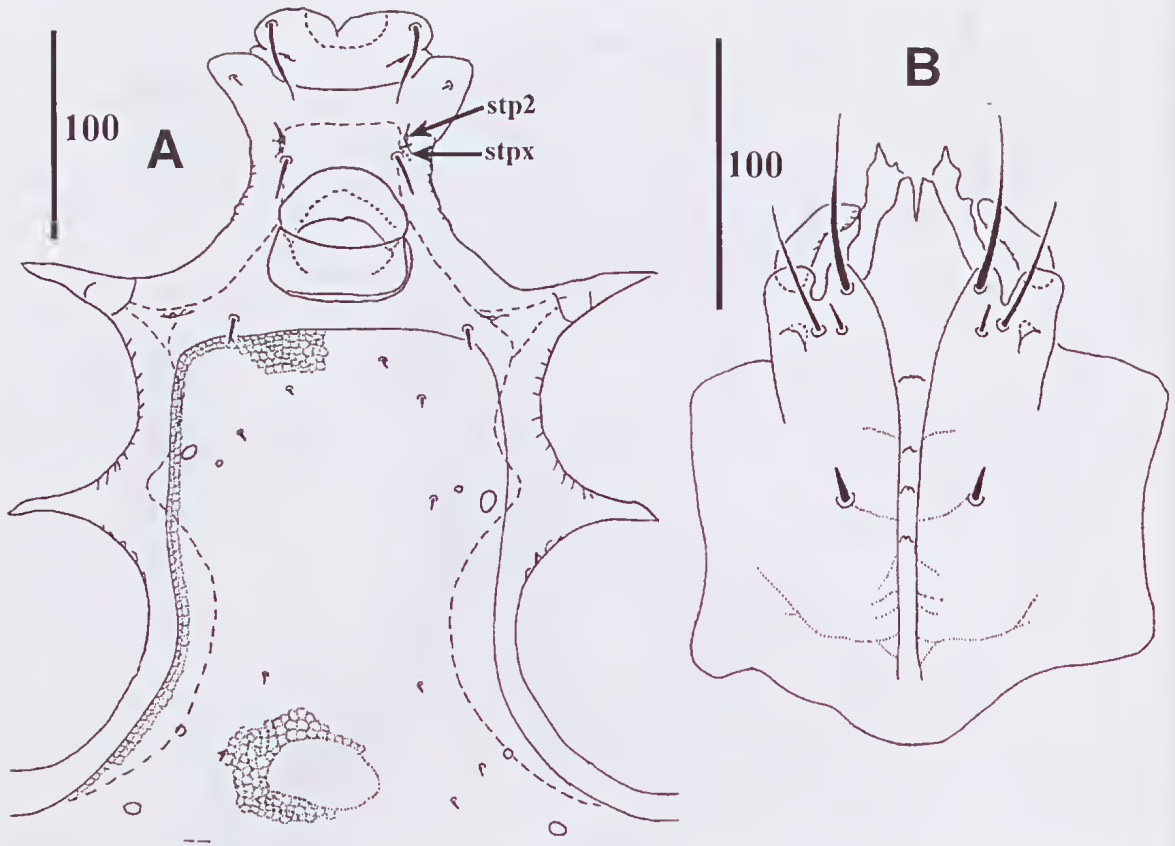


FIG. 6. *Fedrizzia humei* sp. nov. Male: A, sternogenital shield, reticulation extensive but only partially shown; small central patch is smooth; B, hypostome.

Remarks. *Fedrizzia humei* sp. nov. most closely resembles *F. grossipes* Canestrini, 1884, the type-species of *Fedrizzia*. The type specimens of this species are lost, and the species has never been collected again. Womersley (1959) thought he had collected a species similar to *F. grossipes*, and attributed it to *Fedrizzia* sp. cf. *grossipes*, but these were later shown to be *F. sellnicki* Womersley, 1959, and a poor match for *F. grossipes* (Seeman 2007). *Fedrizzia humei* sp. nov. matches *F. grossipes* in several ways (size, patterning, sutures), but Canestrini (1884) illustrated *F. grossipes* with an extensive smooth area surrounding the sternogynal shield (similar to *F. abraidoalves*) and short setae *st3*. In contrast, *F. humei* has a small smooth area and long *st3*.

Fedrizzia oudemansi Womersley, 1959
(Fig. 7)

Fedrizzia oudemansi Womersley, 1959: 24.

Fedrizzia oudemansi — Seeman, 2007: 27 [specimens from Tenterfield and Mt Glorious only].

Material examined. New South Wales: SAMA-N1952290, holotype, ♀, Glen Innes, 9.x.1956, G.F. Bornemissza, on *P. dilatatus* under a eucalyptus log. SAMA-N1952291–N1952293, paratypes, 2 ♂♂, ♀, same data as holotype [note that female paratype does not belong to this species, see below]. SAMA-N1952294, ♂, near Tenterfield, Washpool Ck, 8.x.1956, G.F. Bornemissza, on *P. dilatatus*. Queensland: QM-S74038–39, ♀, ♂, Mt Glorious, 6.v.1995, O. Seeman, ex passalid beetle; QM-S74036–37, 2 ♀♀, Mt Glorious, 21.xii.1995, O. Seeman, ex *M. australasicus*. QM-S95270–73, ♀, 3 ♂♂, Kurrajong Picnic Area, Goomburra Section, Main Range

National Park, 27°58'S 152°20'E, H. Urbina, J. Bartlett, O. Seeman, ex *M. australasicus*.

Diagnosis. Both sexes: idiosoma length 760–820; dorsal shield with 8–10 large pores medially; ventral shield with lineate reticulation laterally, smooth medially; marginal and ventrianal shields smooth; anterolateral corner of ventrianal shield fused with ventral shield; exopodal patterning between CxII–III spotted; pedofossae III absent; CxIV–marginal suture absent; femur III and IV without lamellae, seta *pv1* not significantly thickened; femur IV not elongate, similar to femur III; seta *h1* thickened. Female: setae *st2*–*4* length 6–11; lyrifissure *stp2* posterior to *stpx*; sternogynal shield smooth, flanked by one pair of pores and two pairs of setae. Male: sternoventral shield without suture posterior to genital opening; genital opening flanked by one pair of pores; seta *h1* curved, flattened slightly; seta *h3* positioned level with and mesad of *h2*.

Description. Female: *Idiosoma* length 760–820, width 615–645 (holotype 760 x 615). *Dorsum.* Dorsal shield with anterior hyaline projection bearing one pair of barbed setae, length 65; hypertrichous, with c. 180 minute setae; with numerous (c. 80) smaller pores and 8–10 larger medial pores (subcuticular gland 10–15 diameter); with sublateral line of 16–20 pores; dorsal patterning comprises fine transverse to oblique lines and extensive fine punctations; marginal setae length 6–8. *Venter.* Tritosternum base length 30–32, width 37–40. Presternal and sternal shield smooth; presternal shield crown-shaped, length 29–32 at midline, width 92–100; *st1* barbed, length 40–52; *st2*–*4* length 6–11; posterolateral margin of sternal shield pointed, *st3*–*4*–*3*–*6* anterior to posterior margin, pore *stpx* anterior to *stp2*. Sternogynal shield length 112–120, width 156–167, smooth, flanked by one pair of pores and two pairs of setae. Ventral shield lineate laterally, smooth medially, with a large pore between CxIII–IV, without large pore posteromedial CxIV, three pairs of large pores and 11 pairs of small round pores, 10 pairs of setae, most posterior and lateral length 10–12. Ventrianal shield length 170–185, width 420–475, smooth, paranal setae length 38–42, lateral and anteromedial setae length 18, setae just anterior to anus length 8–10; anterolateral corner of ventrianal shield fused with ventral shield. Marginal shields smooth (Fig. 7A).

Legs. TrI with seta *pv1* with minute barbs, not thicker than seta *av1*. FeI with seta *pv3* similar to seta *pv1* and *pv2*. FeII with lamella distal to seta *pv1*, seta *ad1* with small barbs, thickened. FeIII without lamella, seta *pv1* not spine-like. FeIV not enlarged (Fig. 7C), length 100, width 70 at distal end, without lamella, seta *pv1* not spine-like, seta *pd2* just proximal to seta *ad2*. TaII with seta *av2* spine-like, longer than seta *av3*; TaII with seta *av2* spine-like, subequal to seta *av3*. Legs II–IV setae *ad* and *pd* thickened.

Gnathosoma. Seta *h1* smooth, straight, thickened slightly, length 48–50, distance between *h1*–*h1* 21; *h2* finely barbed, length 40; *h3* length 10, posterolaterad *h2*; palpcoxal seta length 14. Corniculi on tubercles, tubercle length 12; corniculi palmate, tip toothed. Palp, seta *av1* on trochanter with 11 branches, seta *av2* barbed; trochanteral spur with sharp process and two blunt processes. Chelicera, fixed digit length 135, movable digit length 36, fixed digit with two large and two minute teeth; excrescences arise from an enlarged base of digit and comprise a large brush-like process, a ribbon-like process with a serrate edge and a toothed edge, and a ribbon-like process with a crenate and toothed edge; processes extend at least 50 past end of chelicerae.

Male: *Idiosoma* length 745–770, width 570–580. Presternal shield length 23–26 at midline, width 93–98; *st1* with nine barbs, length 41–45; *st2* smooth, length 8; *st3* smooth, length 33–37. Genital opening length 44–48, width 54–57, flanked by one pair of pores. Suture posterior to genital opening absent (Fig. 7B). *Gnathosoma.* Seta *h1* flattened, with fine tip, length 42–48. Seta *h2* length 9. Seta *h3* length 8–9, level with and mesad of *h2*.

Remarks. Seeman (2007) erred by identifying the specimens from Rockwood (described above as *F. classeni* sp. nov.) as *F. oudemansi*. As these were the best available specimens of his putative *F. oudemansi*, they were used as the reference point for the key. Consequently, a new key is required and is provided below. *Fedrizzia oudemansi* is similar to *F. classeni* sp. nov., but like most *Fedrizzia* species, it lacks lamellae on legs III–IV (present in *F. classeni* sp. nov.).

The paratype female (SAMA-N1952293) is not *F. oudemansi*. The slide has spoiled too much

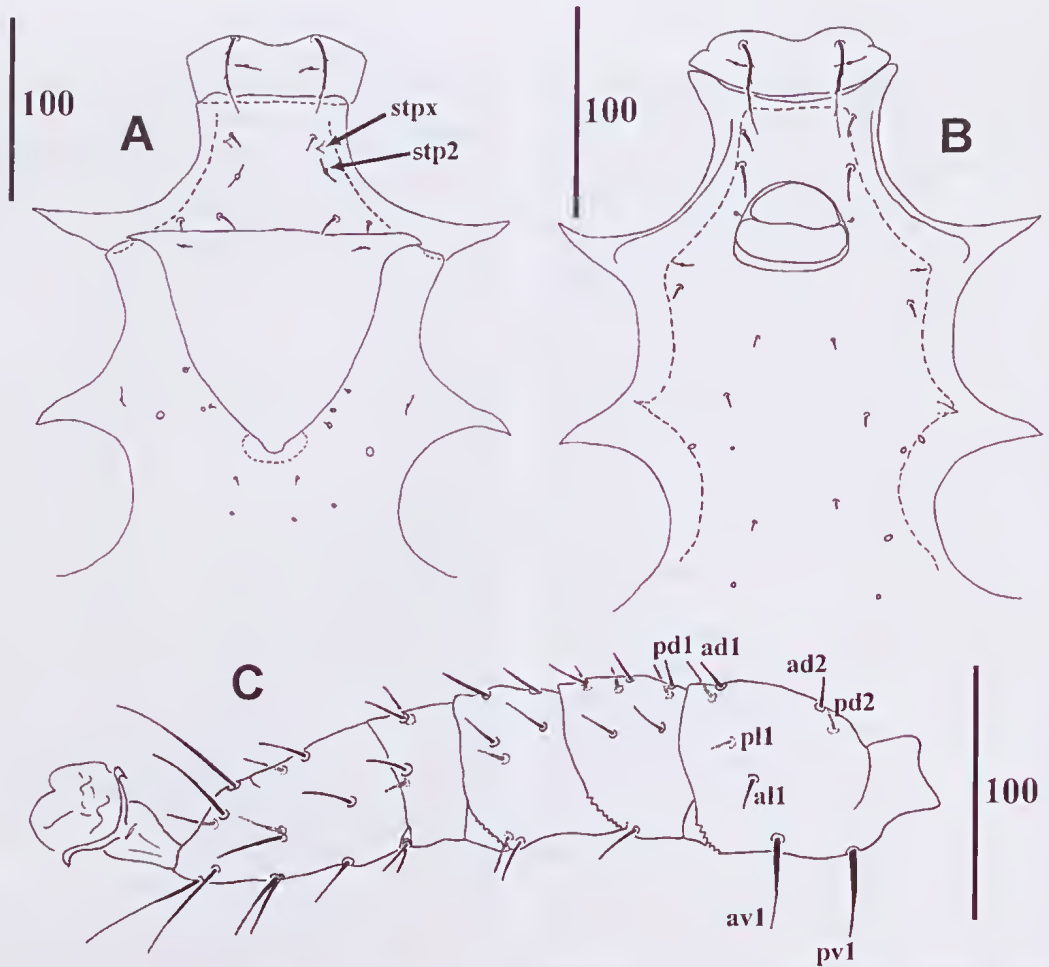


FIG. 7. *Fedrizzia oudemansi* Womersley, 1959. A, female, holotype, sternogynital shields; length and form of *st1*, *st3* and *st4* from non-type material. B, male, non-type, sternogynital shields. C, male, non-type, leg IV, left-hand side anterior view; femoral setae labelled.

to make any further judgement, but it is larger (length *c.* 900) and clearly has a reticulated sternogynital shield. *Fedrizzia oudemansi* is smaller (760–820) and has a smooth sternogynital shield.

Key to Female *Fedrizzia* Species

Idiosomal lengths and countries of origin are given for each species and are given to help eliminate some, but not all, species in couplets. The key is based on Seeman (2007), and illustrations of characters in the key are provided in that paper.

1. Femur III and IV with large lamellae, seta *pv1* thickened. Pedofossae III present.

Exopodal patterning between CxII–III striped. Idiosoma length 1120–1280. [Papua New Guinea].

- *Fedrizzia scutata* (Womersley)
- Femur III and IV without large lamellae, sometimes small distal lamella present, seta *pv1* not significantly thickened. Pedofossae III absent. Exopodal patterning between CxII–III spotted. 2
- 2. Femur III and IV with small distal lamellae. 3
- Femur III and IV without lamellae. 4
- 3. Posterior of sternogynital shield not flanked by a cluster of pores. Ventral shield with small flange that overlaps the posterior of

- sternogynal shield. Idiosoma length 1140–1160. [Thailand]. *Fedrizzia gilloglyi* Seeman
- Posterior of sternogynal shield flanked by 4 pores. Ventral shield does not overlap sternogynal shield. Idiosoma length 725–810. [Northern NSW, Southeast Qld]. *Fedrizzia classeni* sp. nov.
4. Ventral shield entirely lineate-reticulate, sometimes smooth medially, never with mesh-like pattern. 5
 - Ventral shield with mesh-like pattern laterally and sometimes postero-medially. 8
 5. Process of palp trochanter without blunt process. Sternogynal shield length 173–176. Idiosoma length 1000–1040. [Southeast Qld]. *Fedrizzia parvipilus* Seeman
 - Process of palp trochanter with blunt process. Sternogynal shield length < 150. 6
 6. Femur IV elongated, obviously longer than femur III. Sternogynal shield length 140. Idiosoma length 800–850. [Papua New Guinea]. *Fedrizzia carabi* Womersley
 - Femur IV not elongated, only slightly longer than femur III. Sternogynal shield length 120–130. 7
 7. Setae *st2* length 7–11. Sternogynal shield smooth. Idiosoma length 760–820. [Australia]. *Fedrizzia oudemansi* Womersley
 - Setae *st2* length 25. Sternogynal shield lineate-reticulate. Idiosoma length 850–860. [Buru, Indonesia]. *Fedrizzia strandi* (Oudemans)
 8. Ventrianal shield with mesh-like reticulation. Idiosoma length 860–900. 9
 - Ventrianal shield lineate-reticulate or with weak mesh-like reticulation anteriorly; if with mesh-like reticulation, then idiosoma > 1100. 10
 9. Sternogynal shield surrounded by smooth area extending to posterior level of Cx IV; sternal setae *st3* short. Idiosoma length 900. [Australia]. *Fedrizzia grossipes* Canestrini
 - Sternogynal shield surrounded by smooth area extending no further than anterior margin of Cx IV; sternal setae *st3* long, length 49–52. Idiosoma length 860. [Southeast Qld]. *Fedrizzia huinei* sp. nov.
 10. Smooth area surrounding sternogynal shield delineated by a suture, the area extensive, extending well past level of CxIII–IV. Idiosoma length 1020–1070. [Southeast Qld]. *Fedrizzia abradoalves* Seeman
 - Smooth area surrounding sternogynal shield either narrow, the area not extending past level of CxIII–IV, or not extensive and not delineated by a suture. 11
 11. Lateral setae of ventrianal shield length 20–30; sternogynal shield with strong honeycomb-like reticulation. Idiosoma length 1160–1260. [Southeast Qld, Northern NSW *Fedrizzia sellnicki* Womersley
 - Lateral setae of ventrianal shield length 10–20; sternogynal shield reticulated, but not in a strong honeycomb pattern. Idiosoma length < 1100. 12
 12. Setae *st3* length > 20, *st4* length > 10. Ventrianal shield length 127, width 260. Idiosoma length 930. [Northeast Qld]. *Fedrizzia derricki* Womersley
 - Setae *st3* length < 15, *st4* length < 10. Ventrianal shield length 139, width 406. Idiosoma length 930–1000. [eastern Qld]. *Fedrizzia borneniusszai* Womersley

Key to Male *Fedrizzia* Species

1. Femur III and IV with large lamellae, seta *pv1* thickened. Pedofossae III present. Exopodal patterning between CxII–III striped. Idiosoma length 1260. [Papua New Guinea]. *Fedrizzia scutata* (Womersley)
 - Femur III and IV without large lamellae, sometimes small distal lamella present, seta *pv1* not significantly thickened. Pedofossae III absent. Exopodal patterning between CxII–III spotted. 2
2. Femur III and IV with small distal lamellae. 3
 - Femur III and IV without lamellae. 4
3. Sternoventral shield reticulate. Seta *h1* with bulbous base. Idiosoma length 1160. [Thailand]. *Fedrizzia gilloglyi* Seeman
 - Sternoventral shield smooth. Seta *h1* blade-like, base not bulbous. Idiosoma length 700–770. [Southeast Qld]. *Fedrizzia classeni* sp. nov.
4. Sternoventral shield lineate-reticulate, smooth medially. 5

- Sternoventral shield with mesh-like pattern laterally and sometimes postero-medially. 8
- 5. Sternoventral shield without suture posterior to genital opening, intercoxal region smooth. 6
- Sternoventral shield with suture posterior to genital opening demarking smooth (anterior) and reticulate (posterior) regions. 7
- 6. Seta *h1* with swollen base, not distally flattened. Process of palp trochanter sharp, without blunt spurs. Idiosoma length 1000–1030. [Southeast Qld]. *Fedrizzia parvipilus* Seeman
- Seta *h1* distally flattened, without swollen base. Process of palp trochanter with single sharp spur and two blunt spurs. Idiosoma length 745–770. [Southeast Qld, NSW]. *Fedrizzia oudemansi* Womersley
- 7. Sternal setae *st2*–3 length < 10. Idiosoma length 750–880. [Papua New Guinea]. *Fedrizzia carabi* Womersley
- Sternal setae *st2*–3 length > 15. Idiosoma length 760. [Buru, Indonesia]. *Fedrizzia strandi* (Oudemans)
- 8. Suture posterior to genital opening well separated from genital opening, at level of Cx III–IV. Idiosoma length 900. [Qld]. *Fedrizzia grossipes* Canestrini
- Suture posterior to genital opening close to genital opening, at level of mid CxIII. Idiosoma length usually > 900. 9
- 9. Ventrianal shield with mesh-like reticulation medially, excepting small bare patches. 10
- Ventrianal shield without mesh-like reticulation medially, lineate-reticulate instead. 12
- 10. Ventral shield without smooth area between, or just posterior of, Cx IV. Idiosoma length 1160–1260. [Southeast Qld]. *F. sellnicki* Womersley
- Ventral shield with small, medial smooth area between, or just posterior of, Cx IV. Idiosoma length < 1100. 11
- 11. With smooth area on ventrianal shield, just anterior of ventrianal shield. Ventrianal shield mostly lineate-reticulate, mesh-like reticulation weak and anterior on shield. Marginal shields lineate-reticulate, without mesh-like reticulation. Idiosoma length 1020–1050. [Southeast Qld]. *Fedrizzia abradoalves* Seeman
- Without smooth area on ventrianal shield, just anterior of ventrianal shield. Ventrianal shield mostly covered in mesh-like reticulation. Marginal shields with areas of mesh-like reticulation. Idiosoma length 930. [Southeast Qld]. *Fedrizzia lumei* sp. nov.
- 12. Ventrianal shield length 127, width 260. Idiosoma length 930. [Northeast Qld]. *Fedrizzia derricki* Womersley
- Ventrianal shield length 139, width 406. Idiosoma length 905. [Eastern Qld]. *Fedrizzia bornemisszai* Womersley

DISCUSSION

With the addition of these two species of *Fedrizzia*, 12 species of fedrizziid mites are now known from the three Australian species of *Mastachilus* (Table 1). The southern form of *M. australasicus* hosts seven species, but I have never captured all seven from the same beetle, with four being the typical number. The southern form of *M. australasicus* is not common in rainforest, which has been the focus of my previous collecting, so some of these records may represent use of this host species only when it occurs in rainforest. This may be the case for *F. parvipilus*, *F. sellnicki* and *N. vidua*, which are typically found on the much larger *M. quaectionis*, a rainforest specialist. More than one species of passalid can occupy the same log, so it is also possible that these host records represent incidental use of *M. australasicus* as a host. *Mastachilus australasicus* is common at Goomburra State Forest in open forests that fringe rainforest habitats. Here, *M. australasicus* hosts the remaining four species of fedrizziid mite, and none of the species found on *M. quaectionis*, or their host beetle, were found there.

Mastachilus usually hosts species of *Neofedrizzia* (Table 1), and the absence of this genus from *M. polyphyllus* most likely reflects that these new species were collected from two beetles at one locality. Further collecting from this host species will almost certainly discover undescribed species of *Neofedrizzia*.

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Paradiscogaster leichhardti sp. nov. (Digenea: Faustulidae) in *Chaetodontoplus meredithi* (Perciformes: Pomacanthidae) from Heron Island, Great Barrier Reef

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ABSTRACT

Paradiscogaster leichhardti sp. nov. (Digenea: Faustulidae) is described from the intestine of *Chaetodontoplus meredithi* (Perciformes: Pomacanthidae) from the southern Great Barrier Reef. The new species is distinguished by its elongate, spindle-shaped body and vitellarium which forms separate groups at the level of the anterior and posterior ends of the cirrus-sac. This is the second species of *Paradiscogaster* reported from pomacanthid fishes. □ *Paradiscogaster leichhardti*, *Chaetodontoplus meredithi*, Heron Island, Great Barrier Reef.

This volume of the *Memoirs of the Queensland Museum* celebrates the bicentenary of the birth of the distinguished Prussian explorer and naturalist Ludwig Leichhardt, (1813 – c.1848). Leichhardt was one of several important early explorers of inland Australia and, like many of his contemporaries, his interests in natural history were very broad. However, he was exceptional in having his interests extend to the parasites found in Australian native animals. The journal of his 1844-5 expedition from Moreton Bay in south-east Queensland to Port Essington in the Northern Territory refers to a trematode from the Dawson River as follows:

The water holes abounded with jew-fish and eels; of the latter we obtained a good supply, and dried two of them, which kept very well. Two species of Limnaea [sic], the one of narrow lengthened form, the other shorter and broader; a species of Paludina, and Cycas and Unios, were frequent. The jew-fish has the same distoma in its swimming bladder,

which I observed in specimens in the Severn River to the southward of Moreton Bay: on examining the intestines of this fish they were full of the shells of Limnaea and Cycas.

The “jew-fish” referred to here was undoubtedly *Tandanus tandanus* Mitchell, the common Australian freshwater catfish. The “distoma” was almost certainly *Isoparorchis hypselobagri* (Billet, 1898) (Isoparorchidae) the largest and most striking trematode yet reported from an Australian freshwater fish, growing as it does to several cm in length (Johnston 1927; Cribb 1988). The species was described from Australia as *Isoparorchis tandani* Johnston, 1927 but is presently known under the name *I. hypselobagri*. We note that Leichhardt’s keen observations on the diet of the fish would have led him to excellent work in the elucidation of trematode life cycles in another era and with different opportunities. In these circumstances it is our pleasure to celebrate his achievements

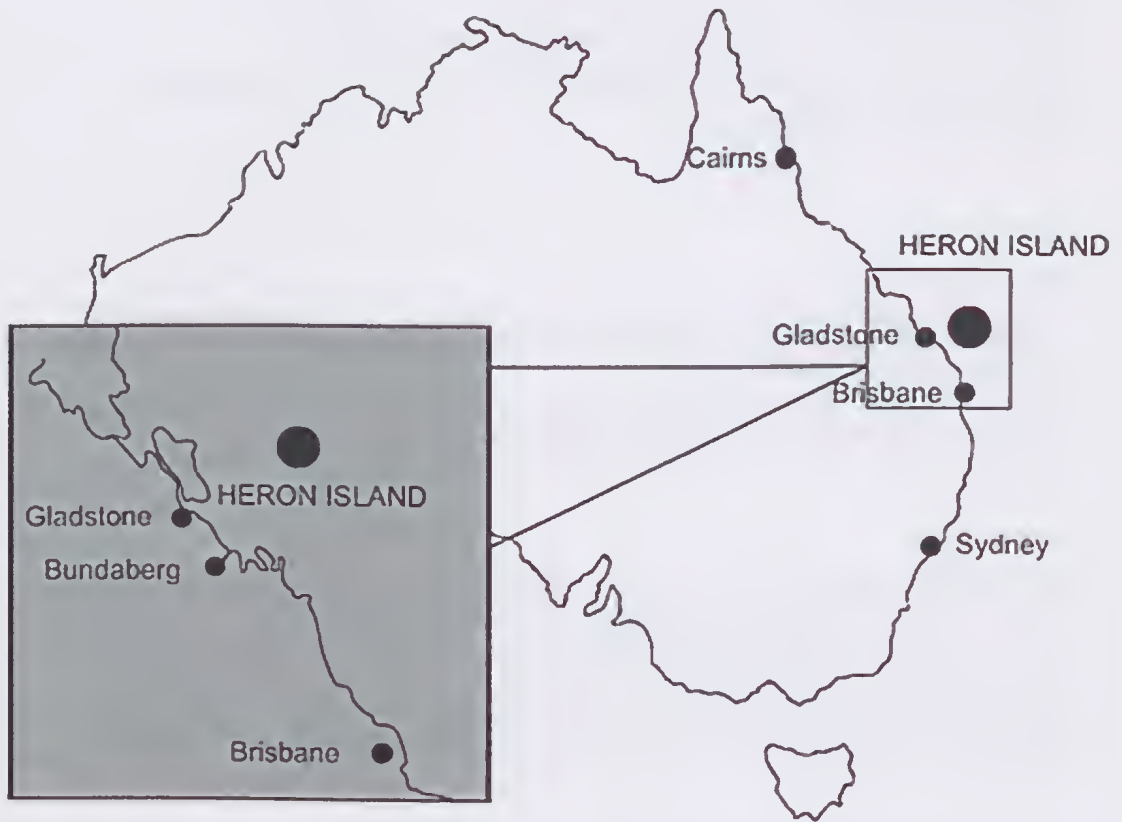


FIG. 1. Position of Heron Island, Queensland.

by the description of a trematode species in his honour.

Paradiscogaster Yamaguti, 1934 is the largest genus in the trematode family Faustulidae. It was proposed by Yamaguti (1934) with *Paradiscogaster pyriformis* Yamaguti, 1934 as the type-species. Species of *Paradiscogaster* are known from 13 families of fishes of which seven, the Carangidae, Chaetodontidae, Drepaneidae, Monacanthidae, Ostraciidae, Pomacanthidae and Triacanthidae, each have more than one species. This study describes a new species of *Paradiscogaster* found in the pomacanthid *Chaetodontoplus meredithi* Kuitert, 1990. The Pomacanthidae is infected by one other species of *Paradiscogaster*, *P. machidai* Cribb, Anderson & Bray, 1999 reported from *Pomacanthus*

semicirculatus (Cuvier, 1831) and *P. sexstriatus* (Cuvier, 1831) (Cribb *et al.* 1999).

MATERIALS AND METHODS

Trematodes were collected from freshly-killed fish hosts from off Heron Island (23° 26' 31" S, 151° 54' 50" E), Great Barrier Reef (Fig. 1). Specimens were fixed by pipetting them into near boiling saline followed by immediate preservation in 5% formalin for morphological study (Cribb & Bray 2010). The worms were washed with fresh water, stained with Mayer's haematoxylin, destained with 1% HCl, neutralized with NH₃, dehydrated in a graded series of ethanol (50%, 75%, 90%, 95% and 100%), and cleared using methyl salicylate. Specimens were then mounted on slides with Canada

balsam. Measurements were taken using an Olympus BH-2 microscope with a calibrated eyepiece micrometer and Spot Insight™ digital camera (Diagnostic Instruments, Inc.) using SPOT™ imaging software. Worms were drawn using a drawing tube, Intuos3 9×12 and Intuos4 6×9 graphics tablets and Adobe Illustrator and Photoshop CS4 software. All measurements are in micrometers (μm) and are given as the range followed by the mean in parentheses.

SYSTEMATICS

Phylum: Platyhelminthes

Class: Trematoda

Order: Plagiorchiida

Family: Faustulidae Poche, 1926

Paradiscogaster leichhardti sp. nov.
(Fig. 2)

Etymology. The species is named for Ludwig Leichhardt (1813–c.1848) an early explorer and naturalist in inland Australia.

Type host. *Chaetodontoplus meredithi* (Cuvier, 1831) (Perciformes: Pomacanthidae).

Other hosts. nil

Type-locality. off Heron Island, Great Barrier Reef, Australia (23° 26' 31" S, 151° 54' 50" E).

Site in host. Intestine.

Prevalence. 2 of 29

Type-specimens. Holotype - G234287; Paratypes - G234288-234291

Description. [Measurements are of 5 gravid specimens.] Body elongate, fusiform, 1722–1912 (1831) × 450–543 (508) (Fig. 2). Tegument spinose and 10–16 thick; spines reaching into anterior hindbody. Forebody 647–747 (692) long, occupying 34.8–41.8 (40.6)% of body length. Oral sucker subglobular, sub terminal, 135–168 (157) × 162–178 (172). Prepharynx short, distinct, always within posterior cavity of oral sucker. Pharynx small, oval, longer than wide, 44–53 (48) × 28–30 (29). Oesophagus 129–391 (260) long. Caeca short, saccular, terminate in forebody, 302–328 (315) long. Ventral sucker large and distinctly

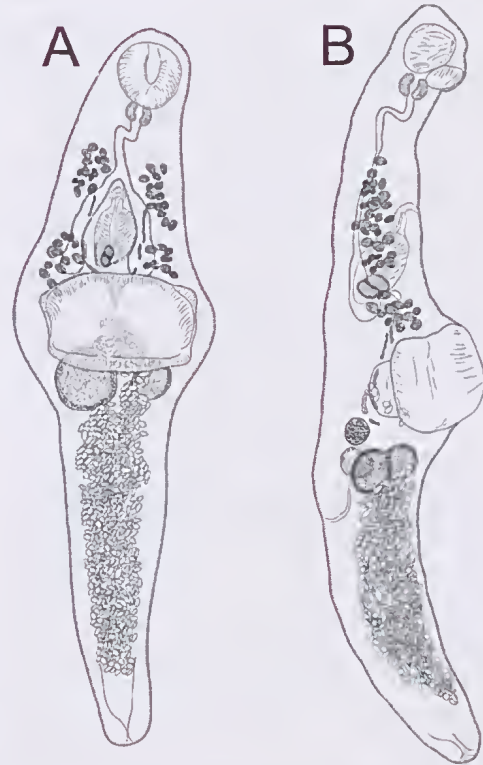


FIG. 2. *Paradiscogaster leichhardti* sp. nov. A, ventral view; B, lateral view. Scale Bar 200 μm.

squared, without anterior or posterior semi-circular muscular appendage, in mid-body, 226–272 (248) × 364–411 (387).

Testes subglobular, opposite, reach to near or overlap posterior margin of ventral sucker; left testis 105–177 (130) × 95–154 (111); right testis 91–122 (106) × 81–97 (88). Cirrus-sac entirely in forebody, 175–220 (192) × 102–137 (119). Internal seminal vesicle bipartite. Pars prostatica narrow, ensheathed by 2 concentric layers, inner with anuclear cell-like bodies and filaments, outer with gland-cells. Ejaculatory duct short. Cirrus small, papilla-like. Genital atrium distinct. Genital pore median, just posterior to intestinal bifurcation.

Ovary subglobular, pre-testicular, at level of ventral sucker, slightly sinistral, separated from testes by uterus or not depending on development of uterus, 61–69 (65) × 68–84 (74). Canalicular

seminal receptacle, rounded, dorsal to testes. Laurer's canal opens dorsally just posterior to testes, sometimes on slight protuberance. Vitelline follicles distributed in two lateral groups; anterior group centred on level of anterior margin of cirrus-sac and intestinal bifurcation to the caeca; posterior group centred on level of posterior margin of cirrus-sac. Uterine coils extensive in hindbody to close to posterior extremity, not at all developed in forebody. Eggs numerous, tanned, operculate, 23–28 (26) × 13–14 (13.5). Excretory pore terminal. Excretory vesicle obscured by eggs in all specimens.

DISCUSSION

This species clearly agrees with *Paradiscogaster* as conceived by Bray (2008). This genus has grown to 22 species of which the greatest concentration (6 species) occur in chaetodontids (Bray *et al.* 1994; Cribb *et al.* 1999). The current species is clearly distinct within the genus in the body form, being elongated and narrow but widest at the level of the ventral sucker. The vitelline follicles are unique in being distributed laterally in two groups at the level of the anterior and posterior ends of the cirrus-sac.

The Pomacanthidae has some importance as hosts of faustulids. Three genera have been reported. *Antorchis* Linton, 1911 is represented by three species, *Paradiscogaster* is represented by two species (including *P. leichhardti* sp. nov.), and *Pseudobacciger* Nahhas & Cable, 1964 by just one species which is also reported from non-pomacanthids, mainly clupeids and engraulids (Madhavi 1975; Margolis 1965; Korotaeva 1969; Dimitrov *et al.* 1999; Gaevskaya 1996; Chun *et al.* 1981; Chun & Kim 1982). Despite the richness of the genus *Chaetodontoplus*, 14 species according to Froese and Pauly (2013), only one has previously been reported as a host for faustulids; *Chaetodontoplus septentrionalis* (Schlegel, 1844) is reported to harbour *A. tsushimaensis* (Machida 1971) Machida 1975 in Japanese waters (Machida 1971; Machida 1975).

Our records suggest that *P. leichhardti* sp. nov. may be specific to *Chaetodontoplus meredithi* in that we have found it in 2 of 29 specimens of that species at Heron Island, but none of 24

individuals of four species of *Centropyge* or nine individuals of two species of *Pomacanthus*. Both *Pomacanthus* species, *P. semicirculatus* and *P. sexstriatus*, are regularly infected by *Antorchis pomacanthi* (Hafeezullah & Siddiqi, 1970) and *Paradiscogaster machidai* at Heron Island (Cribb *et al.* 1999).

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A review of the *Onthophagus posticus*-group (Coleoptera: Scarabaeidae: Scarabaeinae) of Australian dung beetles with five new species.

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ABSTRACT

Five new species of the scarabaeine dung beetle genus *Onthophagus* Latreille 1802, are described in the *Onthophagus posticus*-group, from Queensland and New South Wales, Australia: *O. dryander* sp. nov., *O. leichhardti* sp. nov., *O. murgon* sp. nov., *O. penedwardsae* sp. nov. and *O. toopi* sp. nov. New distribution information is given for the other members the species group and the ranges of all species are mapped. A revised key is given to the twelve species now known in the species group. □ *Onthophagus posticus*, dung beetles, new species, Australia.

The cosmopolitan dung beetle genus *Onthophagus* Latreille, 1802 is one of the largest genera of animals with in excess of 2300 described species. Understanding its phylogeny and application of that to its taxonomic classification is a major challenge being undertaken by global studies based on both morphology and molecules (Emlen *et al.* 2005; Monaghan *et al.* 2007; Tarasov & Solodovnikov 2011). Preliminary outcomes indicate that much of the Australian fauna may be a monophyletic radiation, though few Australian species have been included in analyses.

The Australian species were comprehensively revised by Matthews (1972) who erected a series of 24 defined species groups as a means of dealing with the diversity. These groups were inherently artificial as they applied only to the Australian fauna but had great practical value, especially for identification purposes, and the system was followed by subsequent authors

who have described additional species of Australian *Onthophagus* (Storey 1977; Storey & Weir 1990). The fauna was catalogued by Cassis & Weir (1992) and updated in the Australian Faunal Directory on line (AFD 2013). Currently there are 198 species of *Onthophagus* in the literature from Australia. Of these, 192 are native species, two of which are not recognisable in the absence of specimens and were treated as 'nomina inquirenda' by Matthews (1972), viz *O. grannum* Lansberge 1885 and *O. crotchii* Harold 1871. The other six are introduced species: one is a global 'tramp' which entered Australia prior to 1900 (*O. depressus* Harold 1871; Matthews 1972) and the other five are African species introduced intentionally to facilitate cattle dung removal (*O. binodis* Thunberg 1818, *O. nigriventris* d'Orbigny 1902, *O. obliquus* (Olivier 1789), *O. sagittarius* (Fabricius 1781) and *O. taurus* (Schreber 1759) (Anon. 2008). Another African

introduction, usually ascribed to *Onthophagus* in non-taxonomic literature, is more properly referred to as *Digitonthophagus gazella* (Fabricius 1787) (AFD 2013).

Intensive surveying of dung beetles in Australia in the last thirty years has revealed many additional undescribed species of *Onthophagus*. This paper deals with Matthews' *posticus*-group and describes five new species within the taxonomic structure of the genus established by him. The group is confined to Tasmania and the moister parts of eastern Australia, extending inland to a maximum of 370 km from the coast (Fig 8). The greatest diversity is in southeast Queensland which has five species.

STUDY MATERIAL

Specimens are lodged in the Queensland Museum, Brisbane (QM), the Queensland Department of Agriculture, Forestry and Fisheries, Brisbane (QDPC), the Australian National Insect Collection, CSIRO, Canberra (ANIC), the Australian Museum, Sydney (AM) and the Museum of Victoria, Melbourne (MV). All specimens previously published as being in the University of Queensland Collection (UQIC) have now been merged with QM. Label data for holotypes is cited in full but for other specimens abbreviations of some common collector names are used: G.B. Monteith (GBM), D.J. Cook (DJC). Other abbreviations used include New South Wales (NSW), Queensland (Qld), National Park (NP), State forest (SF), Environmental Park (EP), flight intercept trap (FIT). About 4500 specimens have been available in total, and study has been facilitated by access to databases of the relevant museum collections which were validated by GBM during visits to the museums on behalf of the ANHAT (Australian National Heritage Assessment Tool) project of the then Commonwealth Department of Environment, Water, Heritage and the Arts in 2007/08. All specimens are listed for the new species but it is impractical to list the copious new specimen data for described species. Only important records from specific localities are mentioned for these species in the text, but all

museum records contribute to the distribution maps in Figure 8. Additional Queensland map distribution points are derived from unpublished survey collections made in recent years at Lamington NP (G.B.M. & Rosa Menendez), Beechmont Plateau (G.B.M. & Susan Cully), Moggill Creek (G.B.M. & Tania Kenyon) and Thiaki Creek (G.B.M., Rosa Menendez & Tania Kenyon), some points from which are not vouchered by museum specimens.

GBM and T.A. Weir have devised an informal code number system for known undescribed species of Australian dung beetles (e.g. *Onthophagus* CQ6) and these are used in Australian museum databases and in some publications. The previous code name is given with the description of each of the new species.

SYSTEMATIC TREATMENT

Onthophagus Latreille, 1802

Onthophagus posticus-group

Mathews' (1972) definition of the *posticus*-group, in which he recognised seven species, is modified below to incorporate the five additional species treated in this paper. All twelve species now recognised run to the *posticus*-group in Matthews' key to his Australian species groups. Information derived from Matthews' key, from the key to species presented in the current paper, and from the revised species-group definition given below should be taken as adding to the diagnosis of the new species described in this paper.

Description. Total length 4–8 mm. Eyes strongly to moderately narrow, with 4–9 facet rows across at the widest point, separated by 8–18 eye widths, canthus incomplete or just touching the occipital edge. Head upper surface glabrous except for row of short setae parallel to clypeal margin. Labium variably excised, from shallowly to almost half way to base. Pronotum glabrous, smooth. Elytra always with discal portion of intervals 1–6 glabrous, entirely glabrous in *O. arrilla*, *O. leichhardtii*, *O. murgon*, *O. millamilla* and most *O. turribul*.

Male with frontoclypeal suture always effaced, vertex unarmed, or with a small conical tubercle near each eye (*O. arrilla*, *O. penedwardsae*, *O. posticus* and *O. mulgravei*), or a low swelling between the eyes which is sometimes sub-carinate (*O. leichhardtii*, *O. yackatooon*, *O. penedwardsae* and minor *O. posticus*). Pronotum unsculptured or with a small median, anterior swelling in major males. Fore tibiae elongated and narrowed, with a distal brush of long setae in a cylindrical curved pencil arising from the inner apex (setae more dispersed in *O. toopi*, *O. dryander* and *O. yackatooon*). Inner apical angle of tibia pointed and bent down.

Female without modified forelegs, with frontoclypeal suture present at centre and vertex unarmed except *O. posticus*, *O. leichhardtii* and *O. yackatooon* which have a transverse swelling, faint in the last.

CHECKLIST OF SPECIES

XIX. *POSTICUS*-group

1. *Onthophagus arrilla* Matthews, 1972
2. *Onthophagus dryander* sp. nov. (CQ11)
3. *Onthophagus incornutus* Macleay, 1871
 - *Onthophagus semiliirtus* Frey, 1963
4. *Onthophagus leichhardtii* sp. nov. (CQ3 & NSW3)
5. *Onthophagus millamilla* Matthews, 1972
6. *Onthophagus mulgravei* Paulian, 1937
7. *Onthophagus murgon* sp. nov. (CQ7)
8. *Onthophagus penedwardsae* sp. nov. (NQ12)
9. *Onthophagus posticus* Erichson, 1842
 - *Onthophagus flavolineatus* Blanchard, 1853
 - *Onthophagus leechii* Frey, 1959
10. *Onthophagus toopi* sp. nov. (CQ6)
11. *Onthophagus turral* Matthews, 1972
12. *Onthophagus yackatooon* Storey & Weir, 1990

KEY TO SPECIES OF THE *ONTHOPHAGUS POSTICUS* SPECIES GROUP

1. Pygidium and elytra glabrous. 2
 - Pygidium setose; elytra often with setae on at least interval 8 3

2. Black with a red or orange humeral patch on each elytron; frons and clypeus of male smooth, minutely and sparsely punctate; clypeal suture of female evenly curved, continuous (Bulburin to SE Qld, NE NSW) *arrilla* Matthews
 - Uniformly black; both sexes with clypeus rugose-punctate and frons coarsely punctate; clypeal suture of female with centre straight, not joining genal sections (inland NSW and S Qld). *leichhardtii* sp. nov.
3. Elytra with setae along full length of interval 8, and often on apices of other intervals 4
 - Elytra usually glabrous, at most with scattered setae along anterior half of interval 8 9
4. Male with a small conical tubercle on vertex on the inner side of each eye. 5
 - Male without conical tubercles on head . 7
5. Setae extending full length of interval 7; pronotum with coarse punctures separated by width of one puncture; male pronotum sometimes with a low median swelling at front margin; body and legs uniformly black (inland N Qld) *penedwardsae* sp. nov.
 - If setae present on interval 7, they are only on posterior half; pronotal punctures finer, usually separated by more than one diameter; male pronotum without anterior, median swelling; often with paler patches on elytra, pronotum, pygidium, underside and/or legs; usually with a greenish tinge 6
6. Pronotal punctures larger, separated by 1–2 diameters; colour variable, often with pale margins to the pronotum, pale longitudinal bars at base and apex of elytra, pale pygidium, and pale legs and venter; each elytron often with a circular deposit in centre (NE Qld to tip of Cape York) *mulgravei* Paulian
 - Pronotal punctures very small, separated by many diameters; body dark with greenish tinge, occasionally with vague pale areas at base and apex of elytra; never with deposits on elytra (NE NSW, S Qld and high altitude in N Qld) *incornutus* Macleay
7. Surfaces of head, pronotum, elytra and

- pygidium nitid, shining black, without trace of shagreening; setae on pygidium long, white, straight and pointing downwards, distributed over whole surface (central coastal Qld) *dryander* sp. nov.
- Surface of at least pygidium shagreened, dull; setae on pygidium erect, curled, pale brown, sparsely distributed on sides only 8
8. Surface of pronotum and elytra shagreened; no transverse carina between eyes; colour black with orange humeral patches on elytra (central coastal Qld). *toopi* sp. nov.
- Surface of pronotum and elytra nitid; a low carina between eyes, more pronounced in male; colour uniformly black (inland N NSW) *yackatoon* Storey & Weir
9. Male with a median, anterior swelling on the pronotum; minor male and female with transverse carina on vertex; even numbered intervals of elytra usually pale giving elytra a striped appearance; scattered setae on anterior part of interval 8 (Tas, Vic, SE SA) *posticus* Erichson
- Both sexes with pronotum evenly convex; without transverse carina on head; elytra never striped in appearance; usually without setae on interval 8. 10
10. Size smaller, less than 4.5 mm in length; eyes very narrow, almost linear, 4–5 facets in width, separated by 12–15 eye widths; colour polymorphic in both sexes, may be uniformly black, or black with orange humeral spots, or black with basal and apical bands of elytra and pronotal margins orange; without setae on interval 8 (inland S Qld.) *uurgoni* sp. nov
- Size larger, usually more than 6 mm in length; eyes wider, oval, 7–8 facets in width, separated by 9–10 eye widths; colour usually uniformly dark, often with green tinge, occasionally with indistinct pale patches on humeri and elytral apices; sometimes (in some *O. turrbal* populations with setae on anterior part of interval 8) 11
11. Male genitalia as in Fig 7D, with apices of parameres not strongly deflexed against phallobase; never with setae on interval 8; often with greenish tinge; rarely highly shagreened; restricted to rainforested mountains in NE Qld between 16°S and 18.5°S. *millanilla* Matthews
- Male genitalia as in Fig 7E, with apices of parameres deflexed to almost contact phallobase; rarely with greenish tinge; often highly shagreened; restricted to rainforests of N NSW and SE Qld between 26.5°S and 29.0°S. *turrbal* Matthews
- Females and very minor males will not be differentiated at Couplet 4 in the above key. Running them through both halves of that couplet and checking against distribution and figures should achieve a correct identification.

Onthophagus arrilla Matthews, 1972 (Figs 1A, 7A, 8)

Distribution (Fig. 8). This distinctive rainforest species (Fig 1A) was described from Mt Tamborine, Murwillumbah and Woodenbong (Matthews 1972). Williams & Williams (1983a, b, 1984) and Williams (1993, 2002) recorded it from several coastal NSW localities as far south as Buladelah. Storey (1974) recorded it from Victoria Park near Lismore in NSW and from Bulburin SF, Qld. It is now known from about 450 specimens in AM, ANIC, QM and QDPC from 169 localities over a 950 km north/south range, never far from the coast. Significant new records from NSW include Wishing Well Forest Park (33°06'S, 151°23'E), Bellingen River, Boundary Creek SF, Ewingar SF and Beaury SF (all AM). In Queensland numerous QM records show it occurs in the Border Ranges from Tallebudgera west to Wilson's Peak, in the western suburbs of Brisbane, and in the D'Aguilar, Conondale, Jimna and Blackall Ranges, and in lowlands to as far north as Tinana Creek at Maryborough. There is a disjunction of 160 km in its distribution between Tinana Creek and the outlying, northern, upland population at Bulburin. Aedeagus as in Fig 7A.

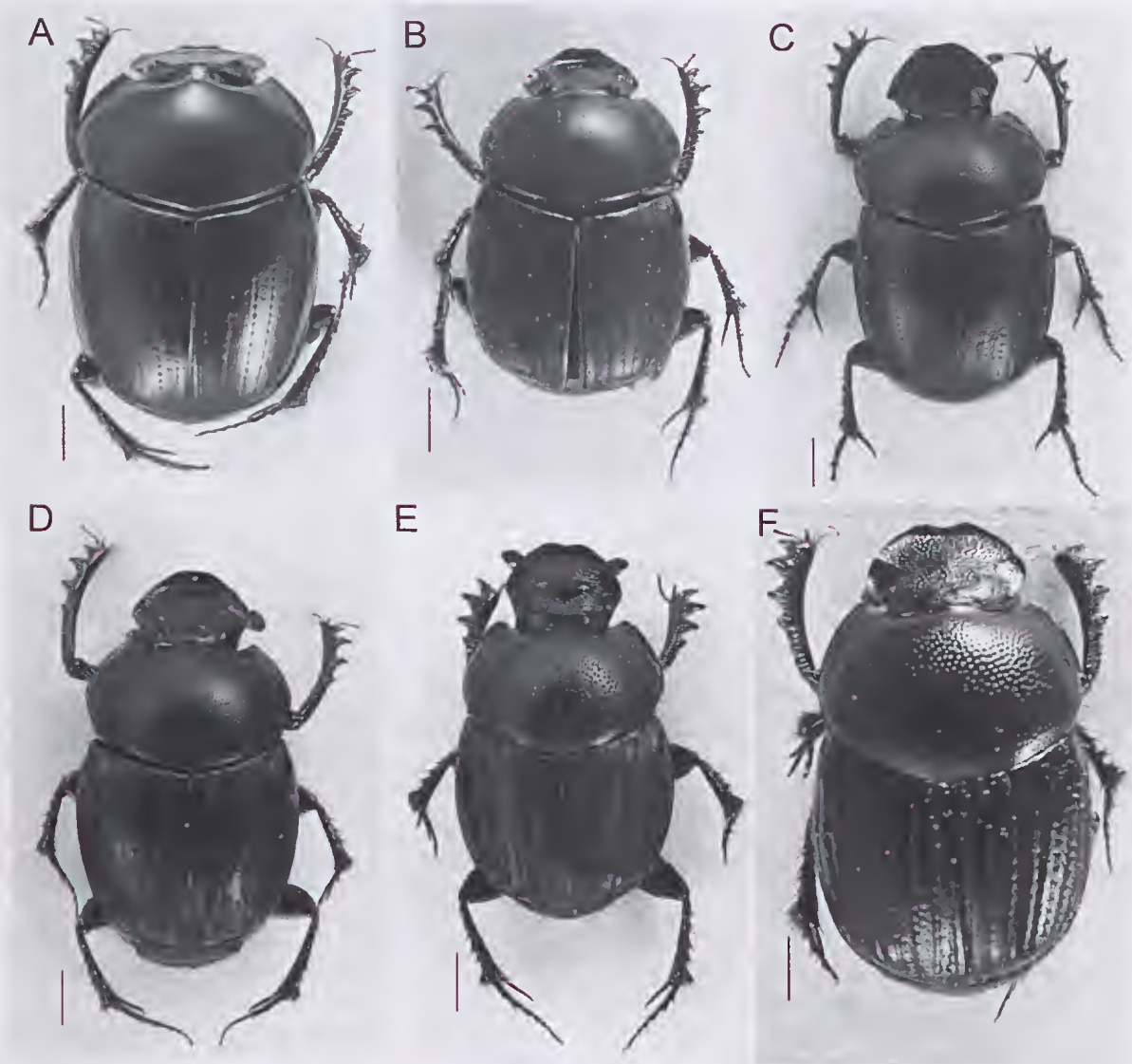


FIG. 1. The described species of the *Onthophagus posticus* group. A, *Onthophagus arrilla* Matthews, male; B, *O. incurvatus* Macleay, male; C, *O. millamilla* Matthews, male; D, *O. mulgravei* Paulian, male; E, *O. posticus* Erichson, female; F, *O. yackatoo* Storey & Weir, male. Scale lines 1 mm.

Onthophagus dryander sp. nov.
(Fig. 2, 7B, 8)

Etymology. Named for the mountain, just east of the town of Proserpine, on which it was collected.

Material examined. HOLOTYPE: ♂, C.Qld: 20°15'S x 148°33'E, Mt Dryander, 650 m, 21 Nov 92 – mid Apr 1993, D. Cook & G.B. Monteith, RF (rainforest) intercept and pitfalls (in QM, QMT156620).

PARATYPES: 3♀, same data as holotype (in QM, QMT156617–156618).

Description. Upperside, underside and legs nitid, shining black except for reddish-orange bases of elytral intervals 2, 4, 6 and 7, those of 6 and 7 coalescing to form an oval humeral spot on each side. Two females with more extensive reddish colouration across the base and apex

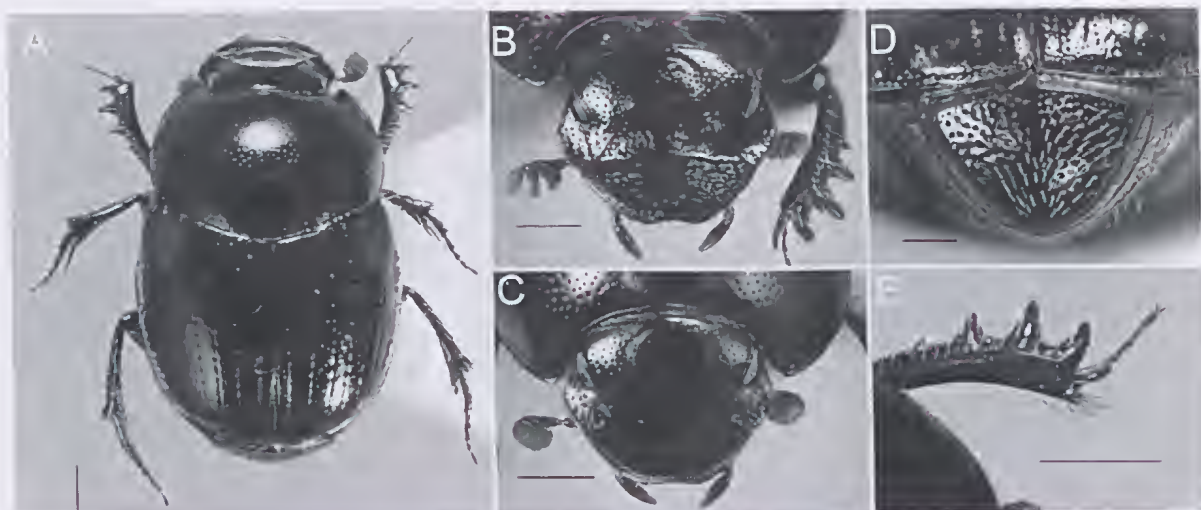


FIG. 2. *Onthophagus dryander* sp. nov. A, male, dorsal view; B, female, head and fore tibia; C, male, head; D, male, pygidium; E, male, fore tibia. Scale lines 0.5 mm.

of elytra. Antennal clubs fuscous. Total length 4.0–4.9 mm.

Male. Head. Clypeal margin medially weakly bilobed, rest of margin straight until genal angles, which are obtusely rounded. Clypeal suture with frontal section entirely effaced. Frons flat, without elevations. Eyes very narrow, 5 facet rows in width, separated by 16 eye widths, canthus incomplete but almost closed. Surface smooth, nitid, with very fine punctures evenly and sparsely scattered over entire surface, glabrous.

Pronotum. Evenly, feebly convex, unsculptured. Anterior angles subacute, apices angulate. All edges with narrow marginal bead. Surface smooth, glabrous, nitid; punctures very small, scattered evenly over entire surface, separated by 6–7 diameters.

Elytra. Intervals flat, smooth, nitid, with scattered small punctures. Striae nitid with small regular punctures. Numerous straight, white, pointed setae present along entire length of last interval, all recumbent obliquely upwards.

Legs. Fore tibiae slightly elongated and narrowed, inner apical angle acute and bent downwards, bearing a sparse tuft of long curved setae about 1.5 times length of spur, which extends slightly

down the inner shaft of the tibia. Spur shortened, curved downwards.

Abdomen. Pygidium convex, nitid, uniformly covered with moderate punctures, each bearing a straight, white, pointed, recumbent seta directed obliquely downwards. Aedeagus as in Fig. 7B.

Female. Clypeal suture complete, uniformly weakly curved, carinate in central four fifths. Clypeal surface strongly transversely rugose. Frons with weak, central, triangular impression. Pronotal surface nitid. Fore tibiae unmodified. Otherwise like male.

Comments. Known only from a small series from long-term unbaited trap collections in rainforest slightly below the summit of 775 m high Mt Dryander, close to the coast and forming a northern extension of the Conway Range (Fig. 8). Its shiny colours and small eyes indicate it is probably a diurnal species. Its closest relative seems to be *O. toopi*, another localised rainforest species from 400 km to the south. Both are small, setose, coloured species with the male fore tibial brush composed of dispersed setae instead of a tight cylindrical pencil. *Onthophagus dryander* has been referred by the code name *Onthophagus* CQ11.

Onthophagus incornutus Macleay, 1871
(Figs 1B, 7C, 8)

Distribution (Fig. 8). Since Matthew's 1972 distribution map, extra records have been published from coastal NSW by Williams & Williams (1983c) and Williams (1993, 2003) while Storey (1973 a, b) recorded it from Bald Mountain and Inglewood in Qld. Queensland sites where it was taken during a survey of pasture dung beetles in 2001–2002 are mapped by Edwards (2003). Emberson & Matthews (1973) noted its accidental introduction to New Zealand. This is one of the commonest dung beetles in eastern Australia (Fig 1B) and almost 1500 specimens are available from 16 localities in eastern New South Wales, 291 localities in southern Queensland and 26 localities within an isolated montane population in the Qld Wet Tropics, over a north/south range of 2100 km. Within NSW its southern limit is extended to the Illawarra region, south of Sydney (Mt Keira, QM) and its western limit to Reedy Creek and Ramornie SF (AM). In Qld the southern population is common in suburban Brisbane and extends west to central highlands of Carnarvon NP and north almost to Mackay (QM). Most of the inland occurrences in Qld are in vine scrubs.

Matthew (1972) discusses geographic overlap and colour pattern intergrading with its close relative, *O. mulgravei*, at the northern end of the Atherton Tableland in the Wet Tropics. This region has now been intensively surveyed for many years. *Onthophagus incornutus* has a relictual pattern in high altitude open forests along the western fringe of the mountain systems (Ravenshoe, Millstream Falls, Tumoulin, Wondecla, Walsh Range, Tinaroo, Atherton, W of Julatten, Windsor Tableland, QM & ANIC), while *O. mulgravei* extends up from the lowlands to occupy the lower and drier rainforests of the northern Atherton Tableland (Kuranda, Wongabel, Tolga, Gillies Highway, QM, QDPC, ANIC). Neither species occurs in the wetter, higher rainforests of the southern Tableland where their place is taken by congener *O. millanilla*. Some specimens of *O. incornutus* from open forests at Tinaroo and Yungaburra have incipient *mulgravei*-type

colour patterns, but are distinguishable by their small pronotal punctures. The apparent genetic tension between the two species in this area, where they are closely contiguous in different habitats, is probably related to that described in the same general area between species pairs of *Tennoplectron* as a result of temporal fluidity of the Black Mountain biogeographic barrier (Reid & Storey 2000; Bell *et al.* 2003). Aedeagus shown in Fig. 7C.

Onthophagus leichhardti sp. nov.
(Figs 3, 7D, 8)

Etymology. Named for the daring and erudite explorer, Ludwig Leichhardt, in the 200th anniversary of his birth. His route in mid-November 1844 (Fig.8) passed through the western limit of the range of this species, just north of the present township of Taroom. Perhaps the species feasted on his leavings. Leichhardt battled to get his men, horses and bullocks through the dense brigalow scrubs and prickly vine forests which form the habitat of this species. Sadly, today they are mostly gone.

Material examined. HOLOTYPE: ♂, QLD: 26°04'S, 150°49'S, "Wonga Hills", site 2, 4-5Mar2002, dung trap, Monteith & Cook, vine scrub, 500 m (in QM, QMT109042). PARATYPES (139): 9♂ 9♀, same data (2♂ 2♀ in ANIC; 1♂ 1♀ in QDPC; 1♂ 1♀ in AM; 5♂ 5♀ in QM, QMT109043-52); 4♂ 8♀, same data but 11-12 Dec 2001 (in QM, QMT107815-19, 109015-21); 1♀, QLD: 26°04'S, 150°50'S, "Wonga Hills", site 3, 520 m, vine scrub, 11Dec 2001-4Mar2002, GBM & DJC, FIT (in QM, QMT109022); 1♂, QLD: 26°03'S, 150°50'S, "Wonga Hills", site 4, 470 m, brigalow, 11-12Dec2001, GBM, dung trap (in QM, QMT107820); 1♂, QLD: 26°06'S, 150°48'S, "Wonga Hills", site 6, 430 m, 4Mar2002, GBM & Wright; 2♂ 3♀, same locality, 4-5Mar2002, GBM & DJC, dung trap, vine scrub (in QM, QMT109055-59); 1♂, QLD, 26°03'S, 151°06'S, Allies Creek, 5 km N., 360 m, vine scrub, 11Dec2001-4Mar2002, GBM & DJC, FIT (in QM, QMT109122); 1♀, same locality, 4Mar2002, S.G. Wright, ex cow dung (in QM, QMT107822); 5♂ 1♀, 25°34'S 151°42'E, Wetheron, 3 km SW, vine scrub, 150 m 27-28Jan1999, DJC, dung pitfall (in QM, QMT99943-48); 8♂, 9♀, 25°40'S, 151°26'E, Nipping Gully, Site 2, 200 m, rainforest, 18-19Dec1998, GBM, dung trap (in QM, QMT99957-73); 6♂, 4♀, same locality, 300 m, 18Dec1998-25Jan1999, GBM & C. Gough, pitfall (in QM, QMT99976-86); 4♂ 4♀, same locality, 25-27Jan1999, GBM, dung pitfall (in QM, QMT99949-56); 1♂, 25°41'S, 151°25'E, Nipping Gully, Site 3, 240 m, open for., 26Jan-2Jun1999, GBM & Thompson, pitfall (in QM, QMT99941); 2♂, 25°42'S, 151°26'E, Nipping Gully, Site 5, 200 m, rainforest, GBM, dung trap (in QM, QMT99974-75); 1♂, 25°38'S, 151°36'E, Gayndah,

hospital hill, scrub rem., 120 m, 25Jan-2Jun1999, GBM & Thompson, pitfall (in QM, QMT99942); 1♂, 25.59°S, 149.77°E, Taroom, 5 km N, 15-16.xii.2000, GBM & DJC (in QM, QMT104995); 9♂ 11♀, 24°49'S 149°45'E, Brigalow Res. Stn., Site 2, vine scrub, 170 m, 16-17Dec2000, DJC & GBM, dung pitfall (in QM, QMT104975-94); 2♂, same locality, 16Dec2000-28Mar2001, DJC & GBM, FIT (in QM, QMT104996-97); 2♂ 4♀, same data but 28Oct-16Dec2000 (in QM, QMT104999-5003); 10♂ 4♀, 25°29'S 151°26'E, Gurgeena Plateau, Site 5, vine scrub, 320 m, GBM & DJC, 14-15Oct2001, dung trap (in QM, QMT107801-14); 3♂ 4♀, 26°13'S, 150°35'E, Barakula, 23 km ENE, 400 m, brigalow scrub, GBM & DJC, FIT trap (in QM, QMT109023-29); 1♂ 5♀, same data but pitfall trap (in QM, QMT109030-35).

Other Material. 1♂, NSW, 31°35'21"S, 147°36'52"E *E. populnea* patch, 23.6 km NW from Warren on road to Canoba, 22 Nov 1999 - 12 Dec 1999, L. Wilkie, J. Tarnawski, H. Doherty, H. Smith, DRRP054/03 pit trap (ANIC); 3♂, NSW, farm 606, Coleambally Irrigation Area, 34°58'03"S, 146°00'45" E, 2-16 May 2004, L. Wilkie & M. Elliot, COLL002/03 pit trap (AM); 1♂, same locality but 35°01'59"S, 145°55'04" E, 14 Dec 1998, L. Wilkie & S. Priday, COLL004/02 (ANIC).

Description. Dorsal surface black, antennal clubs fuscous. Total length 5.0-6.4 mm.

Male. Head. Clypeal margin emarginate in middle, rest of margin feebly rounded to genal angles, which are angulate. Clypeal suture with frontal section effaced, genal sections finely carinate. Vertex with broad v-shaped subcarinate swelling between eyes, effaced in centre. Eyes moderate with 7-8 facet rows across widest point, separated by about 9 eye widths, canthus incomplete. Clypeal surface transversely rugose, strongly punctate, frons not rugose, punctures smaller. Fronto-clypeus with slight swelling in centre. Surface nitid, some shagreening along posterior margin of head, glabrous except row of setae behind anterior margin of clypeus.

Pronotum. Feebly, evenly convex, unsculptured. Anterior angles subquadrate, posterior edge unmarginated. Disc evenly punctate with small punctures, separated by about 1-2 diameters, finely shagreened, more nitid in centre, glabrous.

Elytra. Intervals feebly convex, weakly shagreened to subnitid, with scattered fine punctures, glabrous. Striae shallow, simple with small regular punctures crenulating edges of intervals.

Legs. Fore tibia elongate, narrowed with inner apical pencil-like, curved brush of dense setae as long as fore tarsi, apical spur shortened, downturned at apex, inner tibial apex acute, turned downwards.

Abdomen. Pygidium feebly convex, evenly punctate with shallow punctures separated by about 1 diameter, shagreened, glabrous. Aedeagus as in Fig. 7D.

Female. Clypeal suture with frontal section straight, carinate, not joined to genal sections. V-shaped subcarinate swelling on vertex less developed. Fronto-clypeus without central swelling. Elytral intervals more distinctly shagreened. Fore tibiae unmodified. Otherwise like male.

Distribution (Fig. 8). The species is abundant in vine scrubs and brigalow scrubs around Gayndah and west to Theodore, Taroom and Barakula in inland southern Queensland. Its range within Queensland occupies a diameter of about 200 km. All specimens were trapped using dung baited pitfall traps or unbaited flight intercept traps. A few specimens of this species are available from two well separated sites much further south, west of the Great Dividing Range in New South Wales (near Warren and Coleambally). These sites are in open eucalypt forest which indicates the species may be much more widespread in NSW.

Comments. *Oonthophagus leichhardtii* sp. nov. looks superficially like *O. frenchi* Blackburn in the *untatus*-group, from the same general region, but the elongated and tufted male tibiae refer it to the *posticus*-group. Like *O. arrilla*, it is unusual within the *posticus*-group in being completely glabrous on all dorsal surfaces including the pygidium. Queensland populations have been referred to by the code name of *Oonthophagus* CQ3 and those in New South Wales by *O. NSW3*.

Oonthophagus millamilla Matthews, 1972
(Figs 1C, 7E, 8)

Comments. Matthews (1972) described *Oonthophagus millamilla* and *O. turrbal* on consecutive pages, stating they were closely related.

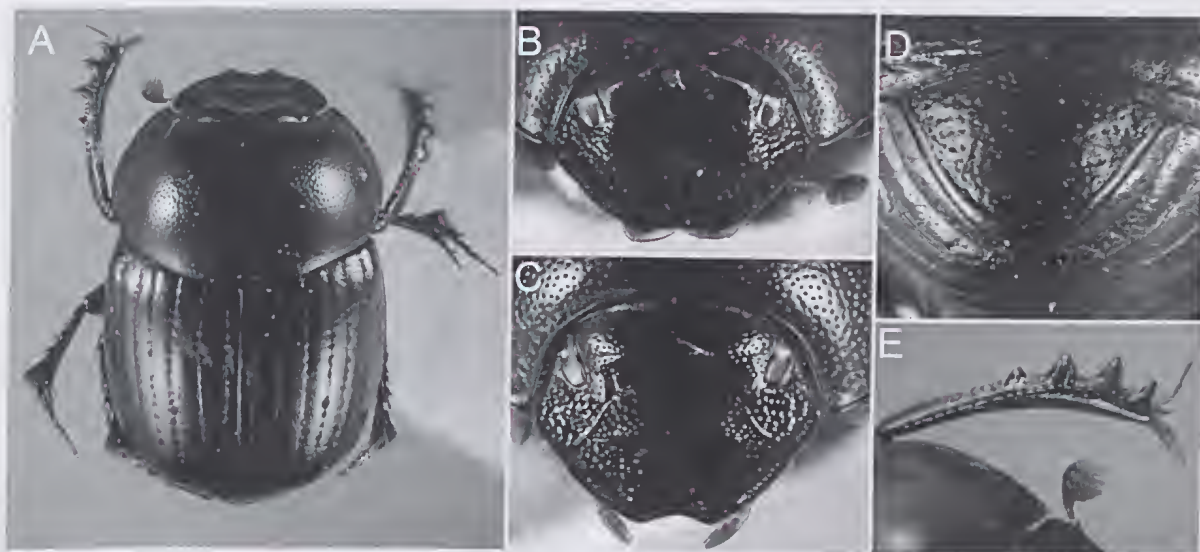


FIG. 3. *Onthophagus leichhardti* sp. nov. A, male, dorsal view; B, male, head; C, female, head; D, male, pygidium; E, male, fore tibia.

At that time *O. millamilla* was known from 10 specimens from two localities on the Atherton Tableland and four specimens from one locality 1300 km further south (Mt Glorious). The southern specimens had greenish tints and pale humeral spots, as in some of the northern specimens, but they also had setae on the anterior of interval 8 not seen in northern examples. On balance he merged them all as one species. From another locality a little further south (Mt Tamborine), he had a series of similar specimens which lacked the setae, the greenish tint and the humeral spots and these were described as *O. turrbal*. We now have more than 1000 specimens of these two putative taxa from 107 localities over a 300 km range in north Queensland and from 74 localities over a 270 km range in south-eastern Queensland and north-eastern NSW. These show that, within S Qld and NE NSW, these minor characters vary from population to population, though an overall unity persists. The presence of setae on interval 8 which Matthews noted at Mt Glorious also occurs uniformly at Mt Mee, occasionally in the Blackall Range, rarely in the Jimna and Conondale Ranges and never in populations south of Brisbane. Greenish tints and humeral spots occur occasionally north of Brisbane but also to the south. More southerly

populations (Lamington and Nightcap Range) tend to be smaller and more strongly shagreened. However male genitalia are uniform throughout the southern populations (Fig. 7K). Similarly, north Queensland populations are much more extensive than the single locality known to Matthews and spread across several mountain systems on both sides of the Black Mountain Biogeographic Barrier, with some morphological variation. All NQ populations have consistent male genitalia (Fig. 7E) which are different to the southern form. All populations are largely confined to rainforested plateaus and fairly clearly represent fragments of more continuous taxa which have been isolated through drying climates forcing rainforests upslope and the erosional dissection of formerly much larger plateau systems. Taking the great geographic separation of the two distinct genitalia types into account we treat here all northern populations as *O. millamilla* and all southern populations as *O. turrbal*.

Distribution (Fig. 8). Since being mapped by Matthews (1972), Brooks (1974) recorded the northern population from Boar Pocket and Monteith (1986) recorded it above 500 m in an altitudinal transect study at Cape Tribulation. The north Queensland population occurs above

about 500 m on all rainforested mountains from Cardwell Range north to Mt Williams, and then again from Mt Lewis north to the mountains behind Cape Tribulation (all QM). *Oonthophagus millanilla* is a dung-feeding rainforest species.

Oonthophagus mulgravei Paulian, 1937
(Figs 1D, 7F, 8)

Distribution (Fig. 8). Since Matthews' 1972 distribution map, Howden *et al.* (1991) record the species (fig 1D) from Wongabel SF, Monteith (1986) records it only as high as 200 m in an altitudinal transect study at Cape Tribulation and only as high as 100 m on the Bellenden Ker transect 1981 (Monteith & Davies 1992). We now have about 600 specimens from 125 localities ranging over 1100 km from the tip of Cape York to Wallaman Falls in the Herbert River valley (QM), with a population on Palm Island a little further south (QM). It is primarily a lowland rainforest species and extends to moderate heights on the eastern side of many plateaus adjacent to coastal lowlands. In the Lamb Range it reaches the unusual height of 1000 m on Mt Tiptree (ANIC) and Mt Haig (QM). See discussion of *Oonthophagus incornutus* for interaction with that species on the Atherton Tableland. *Oonthophagus mulgravei* often has a large patch of grey deposit on middle of each elytron (as mentioned by Matthews 1972) but, when *O. incornutus* very rarely has them, the patches are small. The pronotum is completely dark in populations of *O. mulgravei* at the tip of Cape York and on Palm Island. The aedeagus (Fig 7F) is very similar to that of *O. incornutus*.

Oonthophagus murgon sp. nov.
(Figs 4, 7G, 8)

Etymology. Named for the nearby town of Murgon, close to the birthplace of GBM.

Material examined. HOLOTYPE: ♂, SEQ: 26°09'S 151°59'E, Boat Mt, Summit E.P., 26Jan-20Apr1995, G.B. Monteith, vine scrub, intercept trap (in QM, QMT98188). PARATYPES (50): 10♂ 12♀, same data as holotype (7♂ 9♀ in QM, QMT 98189-204; 2♂ 2♀ ANIC; 1♂ 1♀ QDPC); 1♂ 1♀, same locality, 520 m, 3-4Feb2005, DJC, dung trap (in QM, QMT153601-02); 10♂ 15♀, 26°08'S 151°58'E, Jack Smith E.P. on Boat Mountain, 15Dec1994 - 26Jan1995, GBM, vine scrub, FIT (1♂ 1♀ in AM; 9♂ 14♀ in QM, QMT98211-

21, 98225-35); 1♂, 26°08'S 151°59'E, Nangur S.F., 2nd Site, 24Nov1995-3Feb1996, GBM, 320 m, rainforest, pitfall traps (in QM, QMT98236).

Description. A polymorphic species with three sympatric colour forms: (1) entirely black, (2) black with a red humeral spot on each elytron covering base of intervals 6, 7 and sometimes 8, (3) black with the following orange marks: a band across the base and apex of the elytra, the basal band widening into humeral spots, wide anterior and lateral margins of pronotum, edges of pygidium. Antennal clubs fuscous. Most dorsal surfaces sericeous, shagreened. Total length 4.1-5.1 mm.

Male. Head. Clypeal margin medially emarginate, narrowly reflexed, rest of margin almost straight to genal angles which are broadly angulate. Clypeal suture with frontal section entirely effaced, genal sections very finely carinate. Frons and vertex unsculptured. Surface flat, nitid, glabrous with fine punctures separated by about one diameter, punctures coarser around margins. Eyes very narrow, 5 facet rows in width, separated by 15 eye widths, canthus almost touching occipital edge.

Pronotum. Feebly, evenly convex, unsculptured. Anterior angles angulate. Anterior and posterior beaded margins complete. Surface finely shagreened, numerous small punctures separated by 1-2 diameters, glabrous.

Elytra. Intervals flat to feebly convex, smooth, shagreened, with numerous small punctures, glabrous. Striae shallow, nitid with regular medium punctures slightly crenulating intervals.

Legs. Fore tibiae elongate, slender, inner apical angle bearing a dense tapering pencil of long setae, which are recurved at tip. A shorter looser group of setae located on front margin of apical tooth. Apical spur shortened, bent downwards.

Abdomen. Pygidium feebly convex, shagreened, with shallow medium-sized punctures separated by less than 1 diameter. Surface with short, straight setae located on lateral angles. Aedeagus as in Fig. 7G.

Female. Clypeal suture with frontal section carinate, almost straight to lateral margins of

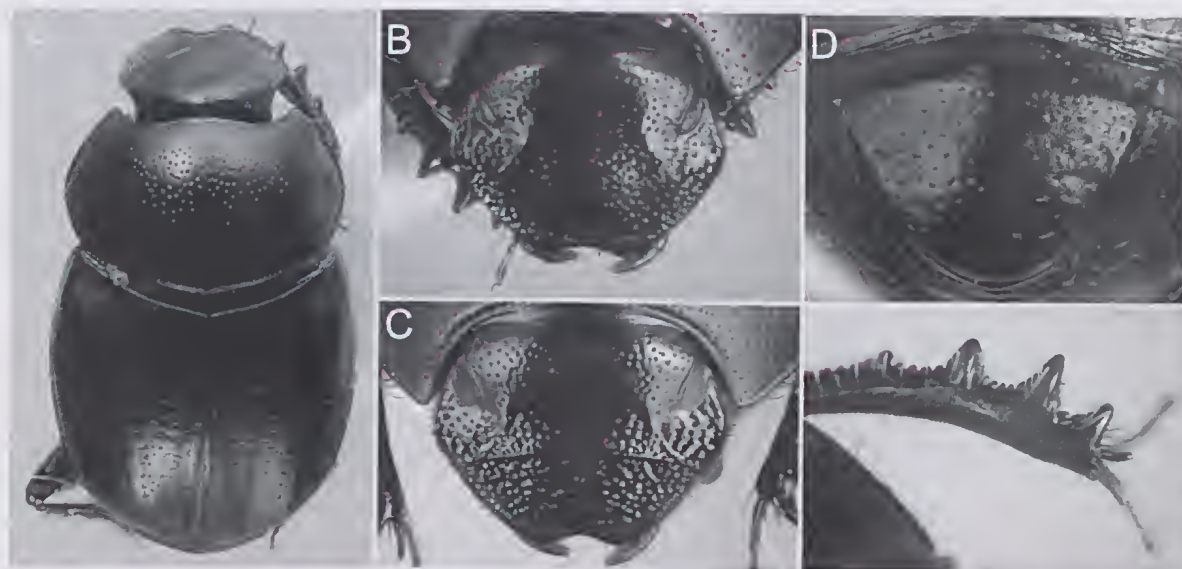


FIG. 4. *Onthophagus murgon* sp. nov. A, male, colour form 3, dorsal view; B, male, head; C, female, head; D, male, pygidium; E, male, fore tibia.

clypeus. Clypeal surface transversely rugose. Frons and frontal area with punctures stronger than male, separated by less than one diameter. Pronotal punctures slightly coarser. Fore tibiae unmodified. Otherwise like male.

Distribution (Fig. 8). Known only from several patches of remnant vine scrubs on and adjacent to a small volcanic plateau known as Boat Mountain, 10 km north of the township of Murgon in the South Burnett district. Its distribution lies within a diameter of 10 km.

Comments. This small species shares some important features with the much larger *O. turrhal* (glabrous elytra, male forelegs with long curved brushes) and may have arisen as an isolate of that species which comes as close as 40 km distant on the Jimna Ranges. The very narrow eyes of *O. murgon* serve to differentiate it. The breakdown by sex of the colour forms of available specimens is: Form 1 (12♂ 12♀), Form 2 (4♂ 1♀), Form 3 (6♂ 8♀). All specimens were collected by dung baited pitfalls or flight intercept traps. *Onthophagus murgon* has been referred to by the code name of *Onthophagus* CQ7.

Onthophagus penedwardsae sp. nov.
(Figs 5, 7H, 8)

Etymology. The specimens were collected during a 2001/02 survey of pasture dung beetles in Queensland, coordinated by dung beetle ecologist Dr Penelope Edwards, a friend from university days, and we take pleasure in giving her name to the species.

Material examined. HOLOTYPE: ♂, 20°39'16"S, 144°23'39"E, 'Delbessie' 35 km NNE Hughenden, 15.v.2001, G. McNamara, cow dung baited pitfall (in QM, QMT 189740). PARATYPES (83): 7♂ 6♀, same data as holotype (6♂ 5♀ in QM, 1♂ 1♀, QDPC); 1♂ 1♀, 20°39'16"S, 144°23'39"E, 'Delbessie' 35 km NNE Hughenden, 18.iv.2001 G. McNamara, Trap 2: Galah Rd, cow dung baited pitfall (in QM); 2♂ 1♀, 20°39'10"S 144°23'17"E, 'Delbessie' 35 km NNE Hughenden, 20.xi.2001, G. McNamara, Trap 2: Galah Rd, cow dung baited pitfall (QM); 1♂ 1♀, same data but 12.vi.2001 (QM); 1♂ 4♀, same data but 16.x.2001 (QM); 24♂ 26♀, same data but 15.i.2002 (23♂ 25♀ in QM, 1♂ 1♀ ANIC, 1♂ 1♀ AM); 1♂ 2♀, same data but 18.ii.2002 (in QM); 2♀, same data but 14.iii.2002 (in QM); 1♀, same data but 16.iv.2002 (in QM); 2♀, 20.38.32S 144.20.41E 'Delbessie' 35 km NNE Hughenden, 14.viii.2001, G. McNamara, Trap 1: Crescent Creek, cow dung baited pitfall (QM); 1♀, same data but 15.i.2002 (QM).

Description. Black, nitid, with very slight purplish shine, antennal clubs fuscous. Total length 3.8–5.9 mm.

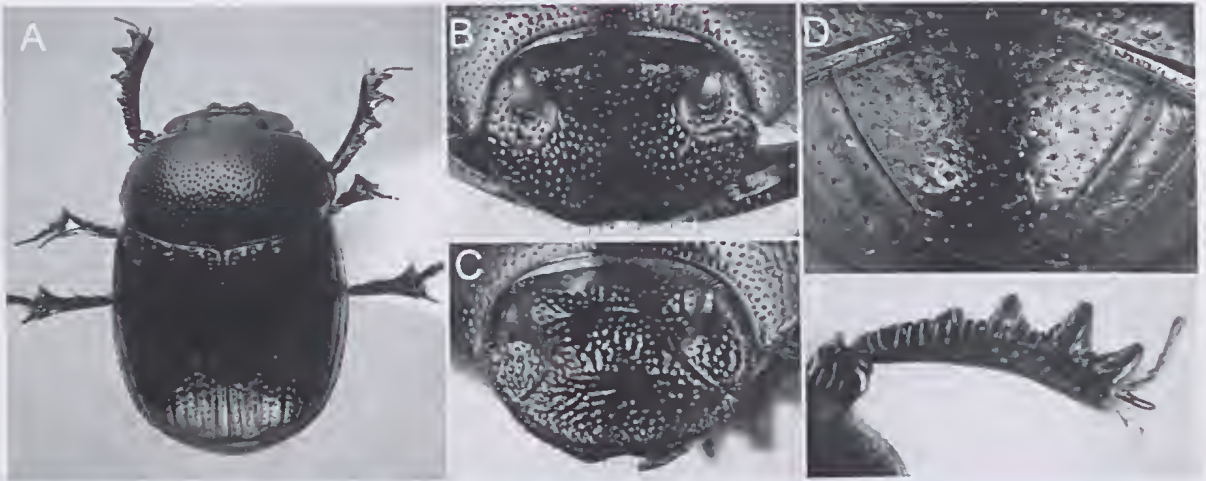


FIG. 5. *Onthophagus penedwardsae* sp. nov. A, male, dorsal view; B, male, head; C, female, head; D, male, pygidium; E, male, fore tibia.

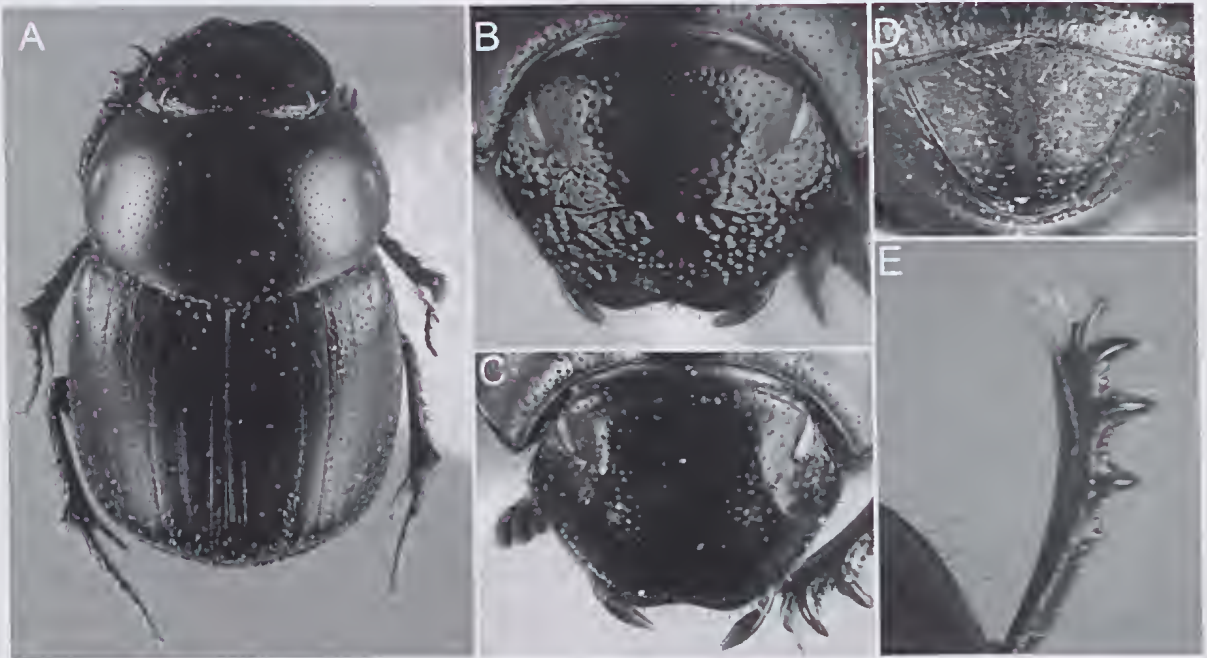


FIG. 6. *Onthophagus toopi* sp. nov. A, male, dorsal view; B, female, head; C, male, head; D, male, pygidium; E, male, fore tibia.

Male. Head. Clypeal margin bilobate, lobes closer together and more upturned in major male, rest of margin almost straight to genae which are rounded, genae somewhat depressed anterior to eyes. Central section of fronto-clypeal suture effaced, with slight central tumescence, genal sections distinct. Frons with

pair of low blunt protuberances, one mesal to each eye. Eyes moderate, with 7–8 facet rows across widest point, separated by 8 eye widths, canthus incomplete. Surface punctate with small punctures separated by about 1 diameter, nitid, glabrous except for a fringe of close-set setae on a beaded ridge behind anterior margin

of clypeus. Punctures almost effaced in centre of head, stronger on genae.

Pronotum. Feebly convex with slight tumescence at centre of anterior margin in some specimens. Anterior angles subacute. All margins finely beaded. Disc nitid with moderate, impressed punctures, separated by less than one diameter near anterior and lateral margins, a little more widely spaced in centre of disc. Glabrous.

Elytra. Intervals slightly convex, apex of second interval depressed, shagreened along edges, rest of surface nitid with scattered small punctures. Sparse recurved setae along entire length of last interval and at apices of other intervals, sometimes extending forward to half length of intervals 6 and 7. Striae shallow with small regular punctures.

Legs. Protibiae slightly elongate and narrowed, inner apical angle down-turned and with dense brush of long setae, spur shortened.

Abdomen. Pygidium feebly convex, shagreened except near apex, covered with small shallow punctures, separated by 1–2 diameters, each with a short seta except along centre line. Aedeagus as in Fig 7H.

Female. Clypeal lobes less pronounced, less upturned and further apart. Central section of fronto-clypeal suture straight, strongly carinate but not joining oblique genal sections. Pronotum without tumescence on anterior margin. Frons without pair of protuberances, replaced by low subcarinate ridge. Clypeal and frontal punctures coarser, more closely set, surface transversely rugose near anterior margin. Protibiae unmodified. Otherwise like male.

Comments. This species very similar in size, colour and setation to another inland species, *Onthophagus yackatoo*, which occurs 1200 km further south in NSW. However *O. yackatoo* has much narrower eyes, lacks head ornamentation in the male and lacks setae on rear of intervals 2 and 4. The free central portion of the fronto-clypeal suture of female *O. penedwardsae* is also distinctive. It has been referred to as *Onthophagus* NQ12 in museum registers and Edwards (2003) maps it as *Onthophagus* sp. nov. 2.

Distribution (Fig. 8). All specimens were taken in traps baited with cow dung at two sites on 'Delbessie' grazing station, NNE of Hughenden. The locality is in semi-arid, sandy alluvial habitat about 15 km S of the Porcupine Gorge NP on the Kennedy Development Road.

Onthophagus posticus Erichson, 1842
(Figs 1E, 7I, 8)

Distribution (Fig. 8). This species (Fig 1E) is comparatively uncommon in collections despite its large size and banded colouration, but 415 specimens are now available from 29 localities in Tasmania, 33 in Victoria and two in South Australia. In Tasmania, it is confined to the drier eastern and northern parts of the island with records now from the NW corner at Woolnorth (ANIC) and King Island (MV). A northern range extension to 45 km S of Bombala (ANIC) places it close to the NSW border. Bornemissza (1983) trapped it with wallaby, wombat, cattle, horse and sheep dung in both Tasmania and eastern Victoria, and speculates that it would have been one of the four dung beetle species that Charles Darwin saw at Hobart in 1836. Faithfull (1992) took it at fox scats in Victoria. The aedeagus is shown in Fig 7I.

Onthophagus toopi sp. nov.
(Figs 6, 7J, 8)

Etymology. This species is named in honour of our good friend, the late John Toop, who died in September 2003, and whose life's passion was the preservation of the limestone karst habitats of the Mt Etna area of central Queensland which form the beetle's sole habitat.

Material examined. HOLOTYPE: ♂, 23°09'S 150°28'E, Johannsens Cave, 18.xii.1999–21.iii.2000, Monteith, vine scrub, intercept, 100 m (in QM, QMT97969).

PARATYPES (38): 6♂ 3♀, same data as holotype (in QM, QMT97960–68); 3♂ 2♀, same data but 7.x–18.xii.1999, DJC & I. Cook (in QM, QMT105351–105355); 1♀, same locality, 14–15 Apr 2010, GBM, dung trap (in QM, QMT178727); 3♂, 23.163°S 150.466°E, Limestone Ridge, Ballroom Track, start, vine scrub, 15 Apr 2010, GBM (in QM, QMT178728–30); 1♀, Capricorn Caves, cabins, 106 m, mowed area, 13–15 Apr 2010, GBM, dung trap (in QM, QMT178726); 15♂ 4♀, Capricorn Caves, RF walk, 100 m, 13–15 Apr 2010, GBM, dung

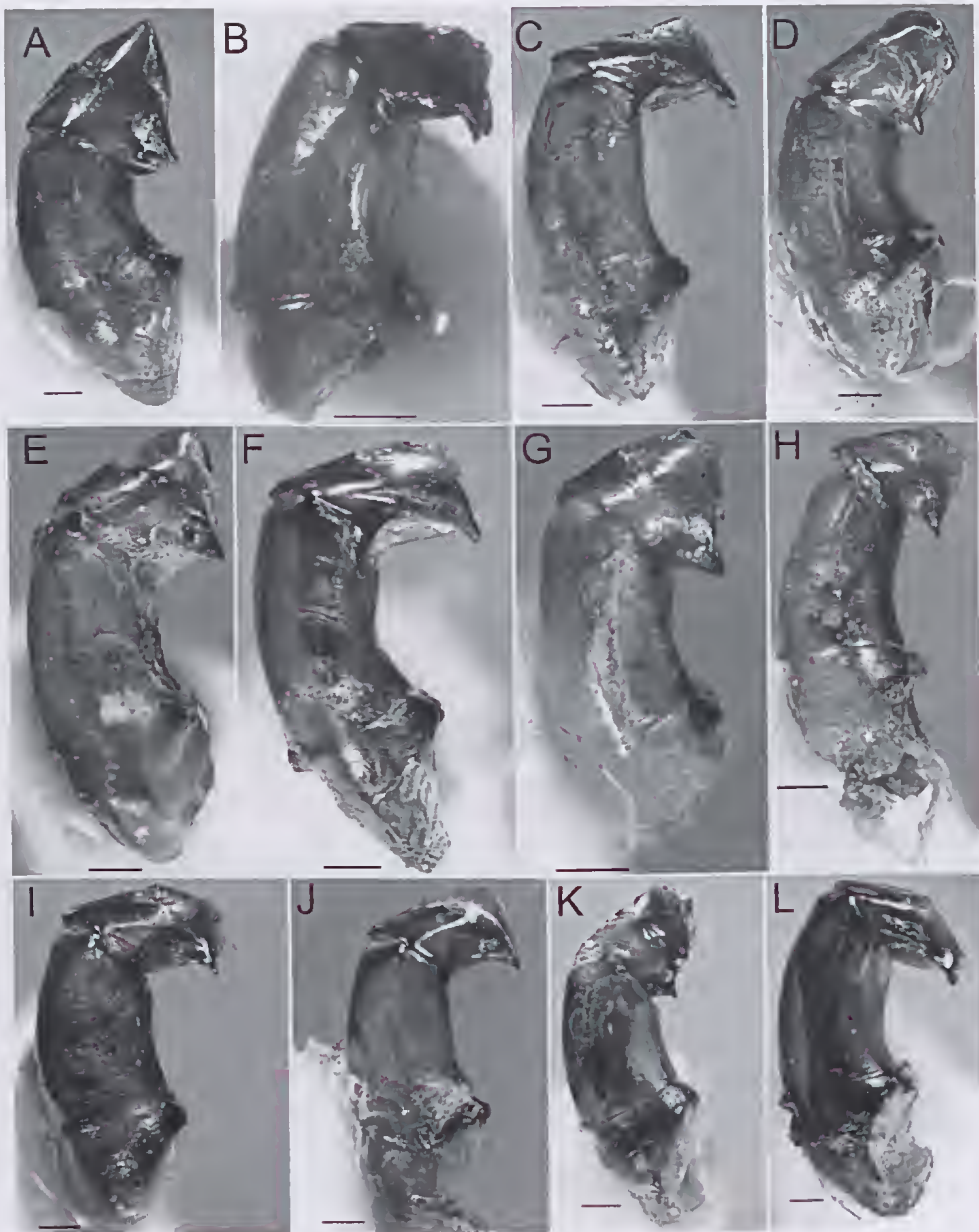


FIG. 7. Genitalia of male *Onthophagus* species. A, *O. arrilla* (Beechmont, Qld.); B, *O. dryander* (Mt Dryander, Qld.); C, *O. incornutus* (Gatton, Qld.); D, *O. leichhardti* (Gurgeena, Qld.); E, *O. millamilla* (Millstream CP, N. Qld.); F, *O. mulgravei* (Kirrama, Qld.); G, *O. murgon* (Boat Mtn, Qld.); H, *O. penedwardsae* ('Delbessie', Qld.); I, *O. posticus* (Boolarra, Vic.); J, *O. toopi* (Johannsen's Caves, Qld.); K, *O. turral* (Lamington, S.Qld.); L, *O. yackatooi* (Nullamanna, NSW). Scale lines 0.2 mm.

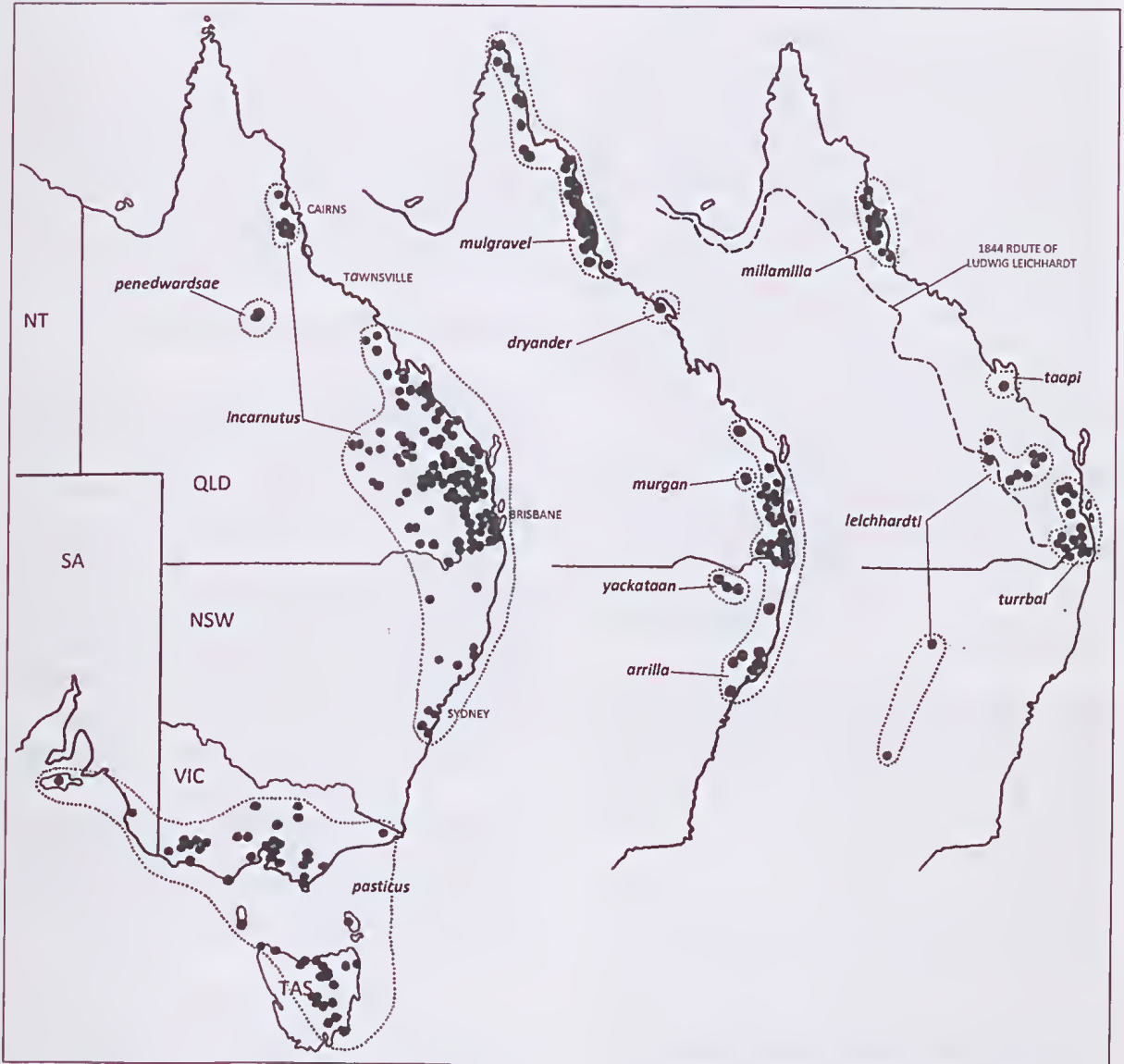


FIG. 8. Distribution maps of all species in the *Onthophagus posticus* species group. The route of the explorer Ludwig Leichhardt is shown.

trap (11♂ 1♀ in QM, QMT178707-18; 2♂ 1♀ in ANIC; 1♂ 1♀ in QDPC).

Description. Predominantly black with a basic pattern of reddish-orange marks on the elytra as follows: short bars on bases of elytral intervals 2, 3, 4, 6, 7, with those of 6 and 7 longer and merging as humeral spots, short bars on sub-apical declivity of intervals 2, 4 & 6, and a narrow strip across the elytral apex. Elytral

marks may be reduced to small humeral spots. Pronotum rarely with pale apex and sides. Abdominal venter, pygidium and femora may be pale or have patches of pale colouration. Antennae fuscous. Dorsal surface all sericeous and heavily shagreened. Total length 4.0–4.7 mm.

Male. Head. Clypeal margin medially deeply bilobed and reflexed, rest of margin almost straight until genal angles, which are roundly

angulate. Clypeal suture with frontal section entirely effaced, lateral portions finely carinate. Frons broadly depressed. Vertex unsculptured. Eyes narrow, 5 facet rows in width, separated by 16 eye widths, canthus incomplete. Surface smooth, shagreened, with fine punctures evenly scattered over entire surface, glabrous except for row of fine setae behind clypeal margin.

Pronotum. Evenly feebly convex, unsculptured. Anterior angles subacute, apices angulate. Hind edge unmargined. Surface smooth, glabrous, entirely shagreened laterally, punctures small, superficial, scattered evenly over entire surface, separated by 2–3 diameters.

Elytra. Intervals flat to feebly convex, smooth, shagreened, with numerous small punctures. Recumbent curved setae present along: entire length of interval 8, apex of intervals 6 and 7 to about 1/4 length of interval, apex of intervals 2, 3, 4 and 5. Striae nitid with small regular punctures. Apex of interval 2 depressed before declivity.

Legs. Fore tibiae elongated, narrowed, inner apical angle bearing a loose brush of long setae, about twice length of spur, distal face of apical tooth also with a tuft of much shorter setae. Inner apical angle of tibia acute and turned downwards. Spur reduced in length, apex turned downwards.

Abdomen. Pygidium convex, shagreened, scattered with small punctures, those on the sides each bearing a curved recumbent seta. Aedeagus as in Fig. 7J.

Female. Clypeal suture complete. Clypeal surface strongly transversely rugose. Punctures larger and deeper in front half of frons. Pronotal surface feebly shagreened all over. Fore tibiae unmodified. Otherwise like male.

Distribution (Fig. 8). Known only from the dry vine forests which grow on the cavernous limestone outcrops which occur within a diameter of about 6 km near Mt Etna, just north of Rockhampton, central Queensland. There are three discrete limestone/vine forest massifs there: Limestone Ridge, Capricorn Caves and Mt Etna (Sprent 1970). *Onthophagus toopi* has been taken in the first two though trapping has not been undertaken at the third.

Specimens were collected using dung baited pitfalls and flight intercept traps.

Comments. *Onthophagus toopi* sp. nov. is similar to *O. incornutus* but differs in being smaller, having more extensive setae on the elytra, in having no tubercles on the male head, and in having the clypeus deeply bilobed. *O. incornutus* also occurs at Mt Etna. Like *O. unurgou*, *O. toopi* is quite variable in its colour pattern. It has been referred to as *Onthophagus* CQ6.

Onthophagus turrbal Matthews, 1972 (Figs 7K, 8)

Distribution (Fig. 8). See discussion of the distribution and taxonomic realignment of this species and *O. millamilla* under treatment of the latter. Storey (1974) recorded *O. turrbal* from Tooloom and Yabra SF (NSW) and Mary Cairncross Park (Qld), while Williams (2002) recorded it from Cambridge Plateau and other sites in far northern NSW. Present material shows the southern population extends from Terania Creek and Whian Whian (AM) in the south, west along the Border Ranges to Bald Mountain (QM) and north to the Jimna and Conondale Range (QM). The aedeagus is shown in Fig 7K.

Onthophagus yackatoon Storey & Weir, 1990 (Fig. 1F, 7L, 8)

Distribution (Fig. 8). All records for this species are within a diameter of about 50 km near Inverell, NSW, and the only new locality since its description is from nearby Nullamanna (AM). The aedeagus is shown in Fig. 7L.

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New teleosts (Elopomorpha: Albuliformes) from the Lower Cretaceous (Late Albian) of the Eromanga Basin, Queensland, Australia

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ABSTRACT

Descriptions of *Marathonichthys coyleorum* gen. et sp. nov. and *Stewartichthys leichhardti* gen. et sp. nov. add to the recognised diversity of the Lower Cretaceous (Late Albian) fish fauna of the marine Toolebuc Formation of the Eromanga Basin, Queensland, Australia. Both taxa are referable to the elopomorph Order Albuliformes. The new taxa are morphologically distinct from both extant and fossil albulids by having their subepiotic and subtemporal fossae poorly developed and in exhibiting separation or apparently partial separation of the parietals by dorsal development of the supraoccipital. The parietal in *Stewartichthys* is triradiate. Coarse ornamentation of the dorsal neurocranial roof and its much shallower and broader otic region separates *M. coyleorum* from *S. leichhardti*. *Euroka dunravenensis* Bartholomai, 2010, also from the Toolebuc Formation, is much larger than either of the new taxa and has its parasphenoid broadened, much shortened posteriorly and anteriorly complex. It is concluded that early evolutionary radiation of the Albuliformes in the Late Albian epeiric inland sea of the Eromanga Basin was reasonably extensive and diverse. □ *Elopomorpha*, *Albuliformes*, *Lower Cretaceous*, *Late Albian*, *Eromanga Basin*, *Toolebuc Formation*, *Marathonichthys coyleorum*, *Stewartichthys leichhardti*.

Mayrinck *et al.* (2010) outlined the history of the currently accepted classification of the elopomorph Order Albuliformes and phylogenetically significant characters. They noted that the order has low diversity and has uncertain internal and external relationships and suggested that the systematics of taxa within the group are therefore of particular interest. Recognition of two albuliform clades by Greenwood *et al.* (1966), the Albulioidei and the Halosauroidae, was modified by Forey *et al.* (1996), who concluded that the Suborder Albulioidei itself involved two clades with each including both extant and fossil taxa within the Families Albulidae and Pterothrissidae. In addition to fossils referred directly to these, a

number of taxa were considered plesions of the Albuliformes *sensu* Forey *et al.* (1996), viz. the Lower Cretaceous South American *Brauneri* (see, Blum 1991) and *Paraelops* (see, Maisey & Blum 1991) and the Upper Cretaceous *Osmuroides* from England (Forey 1973). Recent descriptions of additional plesions have added *Bullichthys* Mayrinck *et al.*, 2010, from the Romualdo Member of the Santana Formation of the Lower Cretaceous (Albian) of Brazil and *Beugeichthys* Filleul, 2000, from the Lower Cretaceous (Hauterivian) of the Massif des Bauges, France.

During detailed examination of the fossil fishes in the collections of the Queensland Museum, it became apparent that additional

albuliform taxa were present in the marine sediments of the Toolebuc Formation of Lower Cretaceous (Late Albian) age, deposited in the north and central west of the Eromanga Basin of Queensland. Unfortunately, few robust morphological character states are represented in the partial neurocrania which are the basis for the descriptions of the new genera and species described herein. Each does exhibit a limited but interesting suite of characters that supports their referral to the Albuliformes *sensu* Forey *et al.* (1996) but that relies in large measure on consideration of largely gross morphological similarities with the above mentioned albuliform *incertae sedis* taxa and with the very specialised, contemporaneous, Toolebuc ?albuloid, *Euroka*, attributed to a new family, the Eurokidae, by Bartholomai (2010a). Description of the new taxa has not been undertaken to consider modification of the phylogeny proposed by Forey *et al.* (1996) but is intended to illustrate the greater diversity of the albuliform fishes during their early radiation, especially in the Southern Hemisphere.

General knowledge of the Australian Late Albian fish fauna has expanded as a result of recent research. Kear (2007) described the first occurrence of a pachycormid, *Australopachycormus hurleyi*, from the Toolebuc Formation near Boulia, SWQ, while Bartholomai (2008) added an additional chimaeroid species, *Ptyktoptychion wadeae* from the same formation from near Richmond, NCQ, from near Boulia, CWQ and from the Allaru Mudstone, near Dartmouth, CQ. Bartholomai (2010a) described the ?albuloid *Euroka duuravenensis* from the Toolebuc Formation near Richmond and he also revised the earlier described aspidorhynchid *Richmondichthys sweeti* and the elopiform *Flindersichthys denmeadi* from the Toolebuc, Allaru and Normanton Formations (Bartholomai 2004, 2010b respectively), with the Normanton Formation having been deposited in the adjacent Carpentaria Basin (Jell *et al.* 2013). Further description of the pachyrhizodontid, *Pachyrhizodus marathoneensis* and an additional, more gracile species, *P. grawi*, have also been undertaken (Bartholomai 2012).

Deposition of marine sediments in the Eromanga Basin has been summarised in Cook *et al.* (2013). By the Late Albian, an epeiric sea covered what is now the centre of Queensland and extended to parts of New South Wales and South Australia. Wade (1993), in describing the Cretaceous squid from the Great Artesian Superbasin, provided a summary of the current understanding of fossilisation within the marine sediments deposited in the area and the conditions of deposition prevailing during both Aptian and Albian times. Most of the fossil fish fauna and associated marine vertebrates have come from the Toolebuc Formation, a thin (25–45 m thick), very widespread unit dated as Late Albian and from the conformably overlying, thicker (360–400 m) Allaru Mudstone (Cook *et al.* 2013). Terrestrial and other contemporaneous vertebrate faunal elements that lived along the coastline or that were washed out to sea and were interred and subsequently preserved off-shore have also been recovered from the marine sediments of the Eromanga Basin, including the Mackunda Formation (Late Albian – early Cenomanian) that conformably overlies the Allaru Mudstone (Cook *et al.* 2013).

Surface exposures of the Toolebuc Formation are limited and outcrop sporadically south of the Euroka Arch, the basement structure separating the Eromanga and Carpentaria Basins (Jell *et al.* 2013) and in an arc along the north-western and western margins of the Eromanga Basin (Henderson, 2004). Slow erosion due to the existing climatic conditions, low dips and minimal surface elevation contributes to difficulties associated with locating additional and more complete specimens. Many of the earlier collections were in calcilutite concretions concentrated on the surface. In recent years, increased public and regional interests in locating fossil vertebrates and greater field research efforts are beginning to provide expanded knowledge of the teleost and other fish faunas. Establishment of local museums in regional centres has encouraged greater collecting as well as deposition of specimens previously held in private collections.

ABBREVIATIONS USED IN FIGURES

atfc	anterior opening of pars jugularis
boc	basioccipital
bsp	basisphenoid
df	dilatator fossa
epo	epiotic
exo	exoccipital
fahm	facet for hyomandibular articulation
fep	foramen for efferent pseudobranchial artery
fica	foramen for internal carotid artery
fm	foramen magnum
foa	foramen for orbital artery
ftpf	foramen to post-temporal fossa
fr	frontal
fsp	foramen for occipital nerve
fuv	fused vertebral centrum
hm	hyomandibular
ic	intercalar
le	lateral ethmoid
myp	posterior myodome
np	notochordal pit
op	operculum
ors	orbitosphenoid
otsc	otic sensory canal
pa	parietal
par	parasphenoid
pop	preoperculum
pro	prootic
psp	pterosphenoid
ptf	post-temporal fossa
ptfc	posterior opening of pars jugularis
pto	pterotic
ptt	post-temporal
scl	supracleithrum
soc	supraoccipital
sosc	supraorbital sensory canal
sp	sphenotic
stt	supratemporal
vc	vertebral centrum
vl	ventral limb of post-temporal
vo	vomer

I	foramen for olfactory tract
II	foramen for optic tract
III	foramen for oculomotor nerve
VII hm	foramen for hyomandibular trunk of facial nerve
VII ot	foramen for otic branch of facial nerve
IX	foramen for glossopharyngeal nerve
X	foramen for vagus nerve

SYSTEMATIC PALAEONTOLOGY

Actinopterygii Cope, 1887

Teleostei Müller, 1845

Elopomorpha Müller, 1845

Order Albuliformes *sensu* Forey *et al.*, 1996

***Marathonichthys* gen. nov.**

Type Species. *Marathonichthys coyleorum* sp. nov., from the marine Toolebuc Formation, Lower Cretaceous (Late Albian), Eromanga Basin, Great Artesian Superbasin, Queensland.

Etymology. Named for "Marathon" Station, east of Richmond, NCQ, from which the type species was collected.

Generic Diagnosis. As for the type species, by monotypy.

***Marathonichthys coyleorum* sp. nov.**
(Figs 1–4, 5E)

Etymology. Named for the Coyle family – Leigh, Thomas, Shannon and Declan, for their enthusiastic interest and encouragement for my work.

Material Examined. Holotype. QMF 53953, partial neurocranium exhibiting some dorsoventral crushing that emphasises the shallowness of the neurocranium and results in some fracturing and minor dislocation of ventral elements. Slight rolling and ventral fracturing, as well as minor loss of marginal and anterior bone, also occurred. Collected from the Flinders River on "Marathon" Station, east of Richmond, NCQ.

Age and Formation. From the marine Toolebuc Formation of Lower Cretaceous (Late Albian) age.

Preservation and Preparation. The holotype of *M. coyleorum* sp. nov. is preserved in a

fragmented, flaky slab of poorly bedded coquina that contained disassociated and broken remains of a variety of different teleosts. Most of the preserved specimens in the recovered parts of the slab are cranial in origin and it is suggested that deposition was in a shallow, marine environment where there was sufficient water movement to sort out much of the less compact, smaller and lighter skeletal material. Regardless, at least two of the taxa represented (including that here described as *M. coyleorum*) are new to the marine fish fauna from the Toolebuc Formation and the Late Albian Allaru Mudstone. The second taxon is insufficiently represented to be formally described at this time. Three left valves of the pelecypod, *Aucellina lughendenensis* (Etheridge, 1872) are firmly adhered to the dorsal cranial roof of the holotype of *M. coyleorum*. Unfortunately, this specimen could not be fully acetic acid prepared at this time, acid preparation facilities being protractedly unavailable. For that reason, mechanical preparation has been undertaken but was restricted to one-half of the ventral neurocranial surface, leaving the other half of the holotype for more delicate acid preparation in the future (Fig. 2).

Specific Diagnosis. Within Albuliformes, *Marathonichthys coyleorum*, is diagnosed by the following characters: a large species with a shallow, broad, flattened posterior and narrow anterior skull roof (shared with albulids and some *Osmeroides*); coarse posterodorsal surface ornamentation is more pronounced than in other albuliforms; the supraorbital canal opens anteriorly close to the front of the orbit (shared with *O. latifrons*); the parietals are lobate, about as wide as long (shared with *Albula*) and separated medially by a dorsal development of the supraoccipital (shared with *Euroka*); the pterotics are posteriorly narrow, forming lateral margin of post-temporal fossa (shared with *Stewartichthys*); the supraoccipital dorsally is short and rectangular; the post-temporal fossa opening is reduced and the fossa is angled anteromedially (shared with *Stewartichthys* and *Euroka*); the subepiotic and subtemporal fossae are poorly developed (shared with *Stewartichthys*); the dilator fossa

is minimally developed and the otic bulla is poorly developed; the parasphenoid is narrow and edentulous and anteriorly has an open median trough between thin, dorsolateral wings from around the posterior of the vomer (shared with albulids) to below the orbits (shared with *Baugeichthys*); the vomer has a medial suture; the orbitosphenoid is expanded by an ossified septum; the intercalar is large, contributing to an intercalar-prootic bridge, which is emphasised by crushing.

Description. A relatively large fish, with preserved portion of neurocranium very flat dorsally, very broad posteriorly and very shallow, 16.8 cm long, 10.5 cm wide across autosphenotic spines and 10.0 cm wide at occiput; depth is 4.4 cm at occiput (but is somewhat reduced by dorsoventral crushing and slight rotation of ventral elements alluded to above; dorsoventral crushing more pronounced at anterior of skull); maximum length of orbit 6.3 cm; otic bullae are minimally inflated; subtemporal and subepiotic fossae poorly developed (dorsoventral compression mentioned above most probably reduced depth of subtemporal fossae and, possibly, extent of inflation of otic bullae); post-temporal fossa opening small, with fossa directed anteromedially; neurocranial roof heavily ossified. Dermethmoid, nasals and anterior of vomer missing.

Frontals very large and moderately deeply medially depressed posteriorly, a feature possibly emphasised by dorsoventral crushing. Anterior to orbits, margin of each frontal narrows markedly. Dorsal frontal surface only very weakly ornamented by insignificant, broad longitudinal ridges and rare but occasionally deeper, narrow grooves; median frontal suture slightly raised, with this dividing into low ridges towards each centre of ossification above back of orbits; medial suture becomes more sinuous posteriorly, especially between centres of ossification. Contact posteriorly with parietal raised, broadly, and deeply zig-zagged. Posterolateral contact with pterotic more regular. Supraorbital canal runs within strong ridge opening anteriorly into narrow, lateral groove above and just in front of orbit. The posterior extent of canal is generally masked

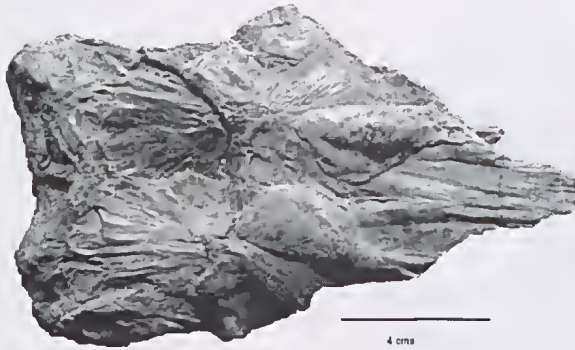


FIG. 1. *Marathonichthys coyleorum* gen. et sp. nov., Holotype, F 53953, dorsal view of partial neurocranium.

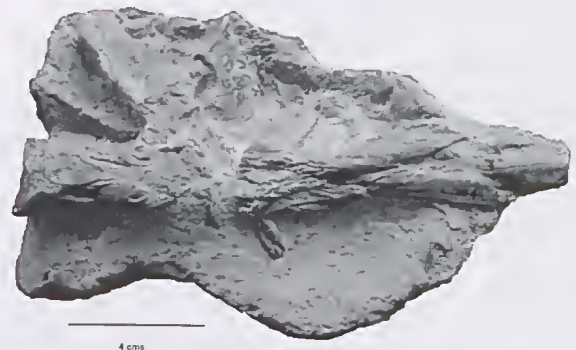


FIG. 2. *Marathonichthys coyleorum* gen. et sp. nov., Holotype, F 53953, ventral view of partial neurocranium.

by surface ornamentation but rare pores are present associated with ridges, anteromedial and medial to centre of ossification and posterolaterally near contact with pterotic. Posterior surface strongly ornamented with significant ridges and tubercles that largely radiate from centres of ossification; other ornamentation of numerous, relatively fine ridges radiating anterolaterally from centre of ossification; coarser but less numerous ridges, radiate anteromedially and medially from this centre, with medial ridges becoming much stronger and higher towards median suture. Laterally, a dished area with broad swellings expands towards margin, immediately anterior to sphenotic spine, separated posteriorly by broad, swollen ridges from strong, angular ridges radiating posteriorly over all of back of frontal, often confluent with ridges on parietal.

Parietals relatively small, lobate, widely separated by dorsal development of supraoccipital, about as long as broad, each with an irregular margin that deeply and coarsely meets frontal, supraoccipital, epiotic and pterotic. Ornamentation is strong and coarse and sometimes continues that from frontals. The bone forms dorsomedial margin of small opening to post-temporal fossa.

Pterotic posterodorsally narrow, excluded from small opening to post-temporal fossa by parietal and epiotic; laterally, it caps posterodorsal corner of braincase. Heavy, irregular, dorsal ornamentation of ridges present,

uniting to form shallow, posterolateral pocket and others curving around above posterior margin. Dorsolateral surface provides roof for dilatator fossa. Otic division of cephalic sensory canal system opens anteriorly through large opening behind sphenotic spine and posteriorly through large pore at posterior margin. Lateral face of pterotic forms margin of almost horizontal, very wide, brain case by contributing to hyomandibular facet, posterior part of dilatator fossa and part of insignificant subtemporal fossa. Dilatator fossa anteriorly deeply roofed, relatively shallow and short but probably reduced by dorsoventral distortion. Pterotic also forms minor anterior part of roof and ventrolateral wall and floor of anteromedially directed post-temporal fossa; opening of post-temporal fossa very small and posterolaterally angled.

Supraoccipital moderately wide and shallow, especially mesially, penetrated by large foramina close to remains of a posteromedial crest whose base extended ventrally to just above foramen magnum. Junction between dorsal and posterior surfaces produced posteriorly into rugose transverse crest, confluent with the top of posteromedial crest. Supraoccipital extends onto dorsal neurocranial surface, rectangular, widely separating parietals.

Epiotic meets raised rim of supraoccipital mesially and contributes to dorsolateral margin and most of medial margin of opening of post-temporal fossa. It carries strong but moderately

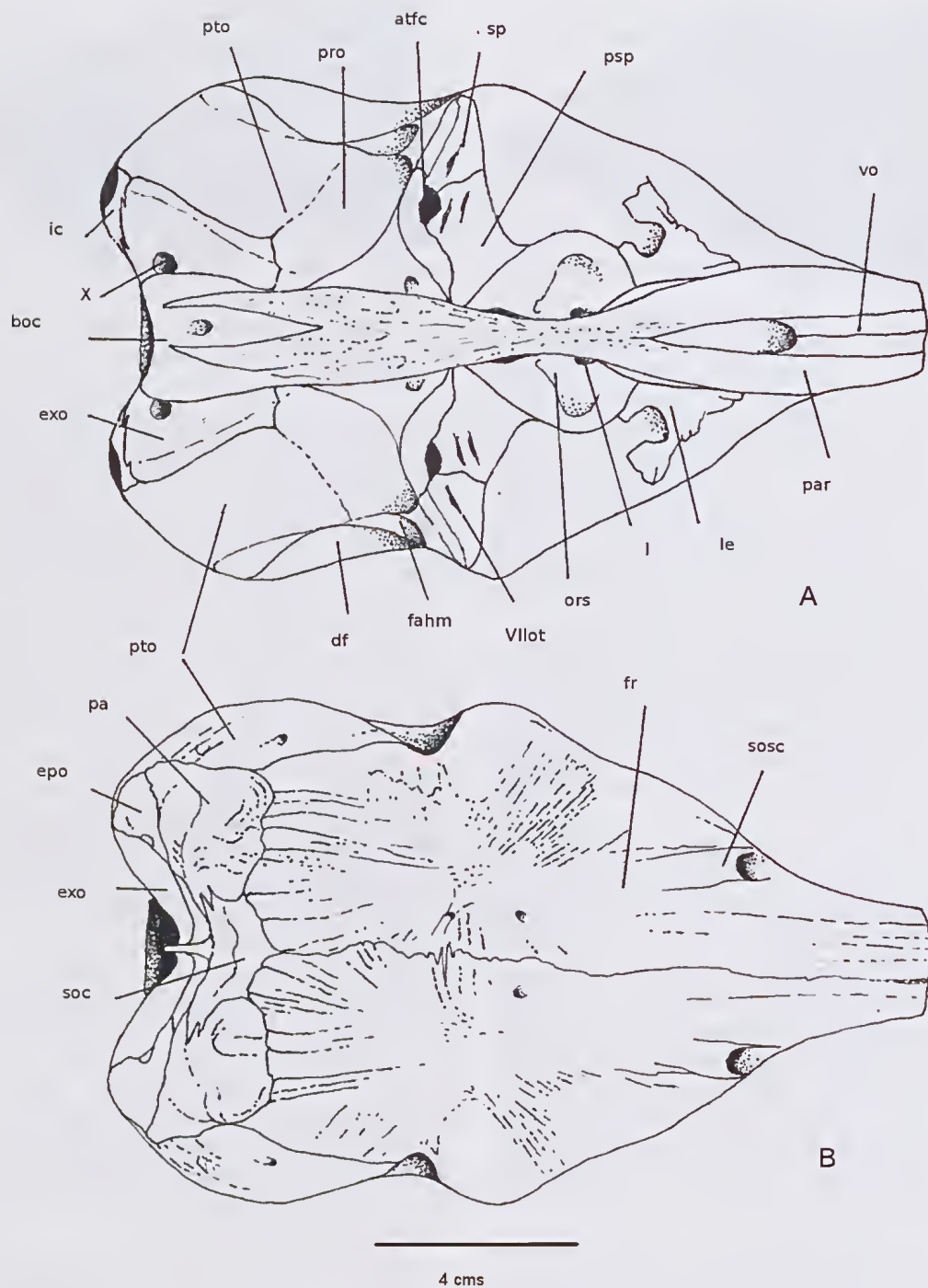


FIG. 3. *Marathonichthys coyleorum* gen. et sp. nov., reconstruction of neurocranium based on the Holotype. A, ventral view; B, dorsal view.

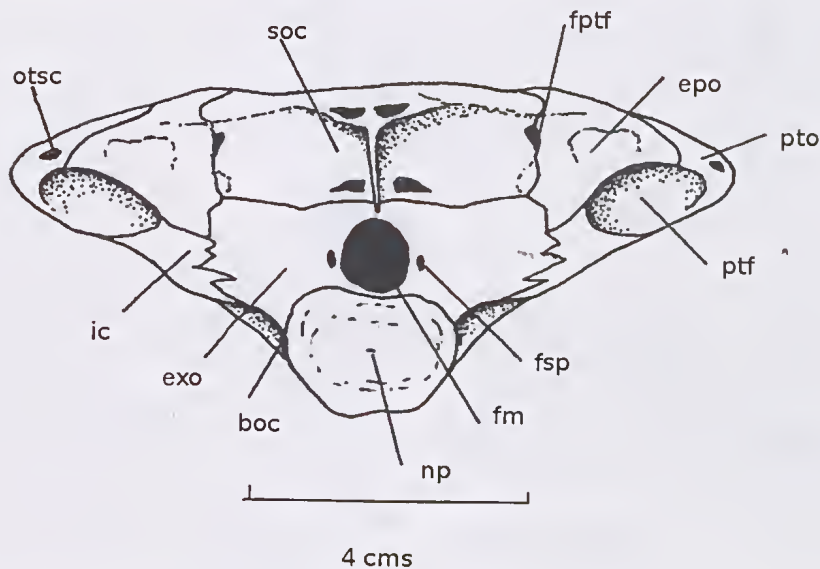


FIG. 4. *Marathonichthys coyleorum* gen. et sp. nov., reconstruction of posterior of neurocranium based on the Holotype, F 53953.

rounded epiotic process dorsally for contact with post-temporal. Subepiotic fossa almost poorly developed. Although emphasised by dorsoventral crushing, posterior surface of the neurocranium divided by a transverse ridge across epiotic/exoccipital suture, separating fossa into sloping, anteriorly directed, dorsal and ventral surfaces.

Exoccipital posterior surface relatively deep but excluded from inner margin of post-temporal fossa by epiotic and vertical arm of intercalar. Element extends onto lateral surface of brain case, penetrated, close to posterior of skull in a slightly elevated, large foramen for nerve X. Bulk of contribution to lateral surface of brain case near horizontal. Lateral to this, surface largely masked by closely adhering element of gill arches but extends towards the hyomandibular facet. Subtemporal fossa obscured but apparently poorly developed. Junction with lateral part of basioccipital along a sharp, longitudinal ridge, probably emphasised by dorsoventral crushing.

Intercalar relatively large, with narrow dorsal arm, forming ventromedial margin of post-temporal fossa. Posterior coarsely

ridged to accommodate tendons from ventral arm of post-temporal and appears to be penetrated by foramen angled posterodorsally from post-temporal fossa. Prominent anteromedial ridge meets similar ridge from prootic to form prootic-intercalar bridge (emphasised by crushing) lateral to the foramen for the vagus nerve.

Basioccipital forms occipital condyle. Element overlain ventrally by posterior prongs of parasphenoid below posteriorly directed opening into posterior myodome, forming its roof. Lateral junction with exoccipital along sharp, longitudinal ridge (emphasised by crushing), close to but below foramen for vagus nerve and separated from base of bone by strong, broad groove. Additional foramen present on one lateral edge of occipital condyle.

Prootic partially covered by matrix and by displaced and closely pressed element from gill arches, possibly an epibranchial. Prootic contributes anterior moiety of sharp, well defined prootic-intercalar bridge. Element penetrated by posteriorly directed foramen of jugular canal positioned close to suture with exoccipital but

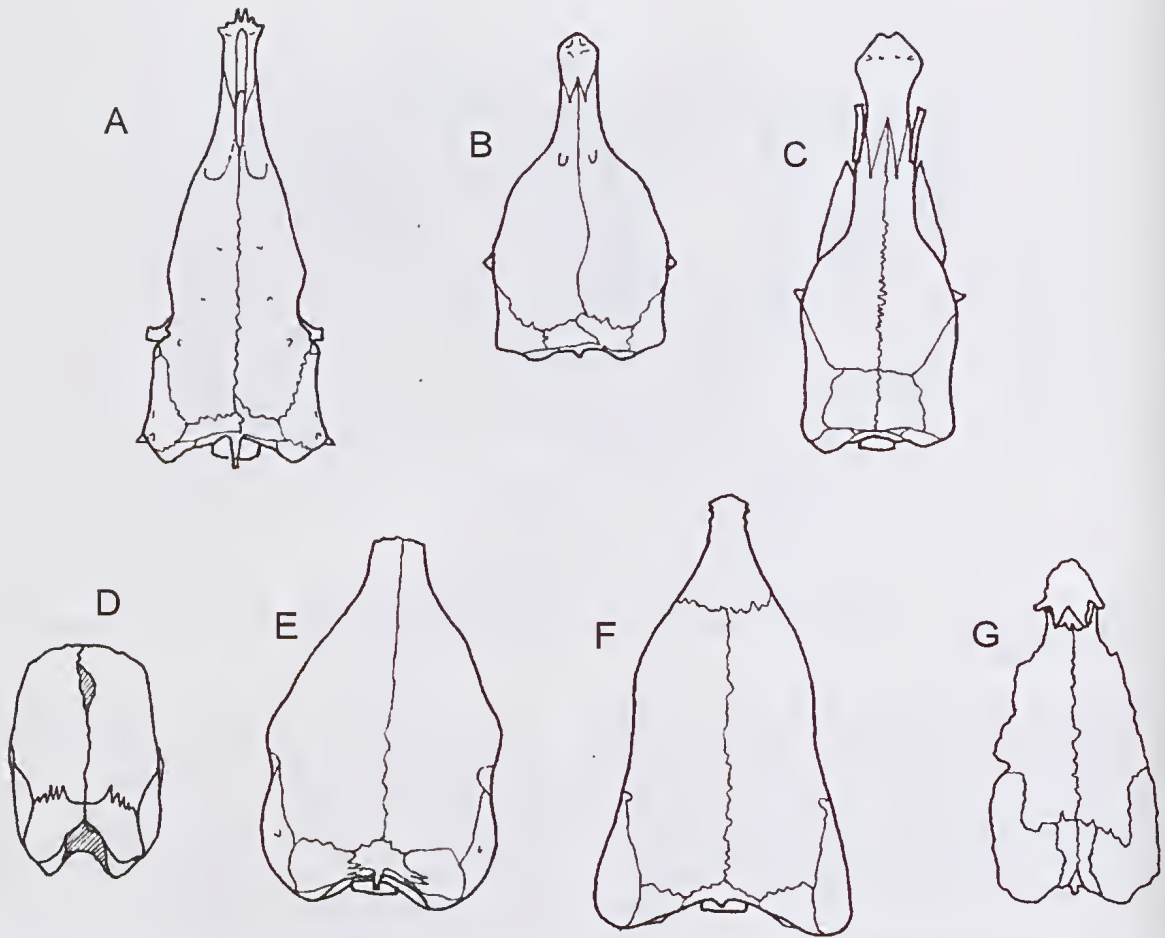


FIG. 5. Comparison of neurocranial dorsal surfaces (not to scale) of selected elopiform fishes: A, *Albula vulpes*, adapted from Forey (1973, fig. 75); B, *Osueroides latifrons*, adapted from Forey (1973, fig. 55); C, *O. lewesiensis*, adapted from Forey (1973, fig. 46); D, *Stewartichthys leichhardtii* gen. et sp. nov., Holotype (hatching across bone loss areas); E, *Marathonichthys coyleorum* gen. et sp. nov., Holotype (with slight correction for bone loss and distortion); F, *Euroka dunravenensis*, composite reconstruction based on the holotype and F 12759; G, *Paraclops caerensis*, (from Maisey 1991, p. 262, figure A).

between base of weakly expanded otic bulla and ridge to intercalar. Anteromedial border of the hyomandibular facet with ridge, while deep excavation at base of ascending process of parasphenoid largely masked. Anterior prootic face penetrated by large anterior opening of pars jugularis, close to margin of sphenotic.

Basisphenoid not exposed.

Sphenotic triangular, with apex pointed laterally and inclined posterodorsally as

reduced autosphenotic spine but spine possibly slightly reduced by bone loss. Ventral edge is relatively deep. Posterolateral surface slightly fluted and separated from anterolateral edge of hyomandibular facet by thin ridge less well developed than that along anteromesial margin of facet. Anterior face of sphenotic inclined, relatively expanded, penetrated by otic component of nerve VII, while posterodorsal face forms anterior of dilatator fossa.

Pterosphenoid extended anterodorsally, inclined anteriorly. Contact with basisphenoid obscured by dorsoventral crushing. Small, anterodorsal foramen possibly carried trochlear nerve, while large notch at medial edge possibly for anterior cerebral vein.

Orbitosphenoid and associated ossified septum greatly expanded anteriorly, meeting pterosphenoid posteriorly but just excluded from contact with sphenotic. Junction between septum and orbitosphenoid not recognisable. Anterolateral expansion "ear-like" in shape and centrally depressed. Combined elements reached and probably contacted parasphenoid. Dorsolaterally, orbitosphenoid unites with ventral surface of frontal, half-way to lateral orbital margin. Large foramen for olfactory nerves lies towards anteroventral base.

Lateral ethmoid incomplete, relatively large, defining anterior extent of orbit. Bone relatively short, meeting thin dorsolateral wing of parasphenoid ventrally and attached dorsally to frontal at crests of two longitudinal swellings, leaving large foramen between all elements involved. Posterior border curved to form orbital border. Lateral ethmoid appears to meet counterpart medially. A prominent, poorly developed, rounded articulation for contact with palatine present.

Parasphenoid moderately broad but, although dorsoventrally skewed during preservation, appears to have also been raised ventrally into sharp, central, longitudinal ridge below orbital area. No evidence present of any parasphenoid teeth. Notch present at anteroventral base of reduced ascending parasphenoid wing, apparently for passage of orbital artery. Parasphenoid fractured transversely, separated slightly just anterior to prootic. Dorsolateral wings extend anteriorly from below orbits to meet lateral ethmoids and are spread and flattened, allowing body of element to move closer to lateral ethmoid and frontal; anteriorly, these dorsolateral wings also border medial, ventrally open trench, extending from body of parasphenoid to body of back of vomer.

Posterior base of vomer sandwiched between divided dorsolateral wings of parasphenoid. Longitudinal, medial groove present, suggesting possible division of vomer during development. No vomerine teeth preserved, nor any evidence for pedicels.

Order ?Albuliformes *sensu* Forey *et al.*, 1996

Stewartichthys gen. nov.

Type species. *Stewartichthys leichhardti* sp. nov., from the marine Toolebuc Formation, Lower Cretaceous (Late Albian) age, Eromanga Basin. Great Artesian Superbasin, Queensland.

Etymology. Named for Stewart Creek on "Dunraven" Station, northeast of Richmond, NCQ, from which the type specimen was collected.

Generic Diagnosis. As for the type species, by monotypy.

Stewartichthys leichhardti sp. nov. (Figs 6-13, 5D)

Materials. Holotype. QMF 13861, posterior of partial cranium and extreme anterior of body, with some depression of neurocranial surface above braincase by crushing and lacking most of the supraoccipital and most of parasphenoid, from an unnamed tributary of Stewart Creek, on "Dunraven" Station, northeast of Richmond, NCQ. The specimen has been prepared by use of unbuffered, about 10%, acetic acid.

Age and Formation. From the marine Toolebuc Formation of Lower Cretaceous (Late Albian) age.

Etymology. Named for the 19th century explorer, Ludwig Leichhardt.

Specific Diagnosis. Moderately large species. Neurocranial roof medially flattened, depressed above braincase, relatively narrow (shared with *Osmeroides levis*), ornamented with low, irregular and interrupted ridges, often anastomosing (shared with *O. lewesensis*). Parietals large, triradiate, long, apparently partially separated posteriorly by small dorsal wedge of supraoccipital, contributing to roof of post-temporal fossa dorsolaterally. Supraorbital sensory canal extends into parietal. Dilator fossa short but anteriorly broad and deep, with its floor separated by significant cleft between sphenotic and pterotic. Sphenotic spine non-existent. Pterotic very narrow posteriorly, not

contributing to dorsal rim of post-temporal fossa (shared with *Marathonichthys*) with otic sensory canal uncovered. Post-temporal fossa large, angled anteromedially. Epitotic broad with buttress strongly developed above a poorly developed subepitotic fossa. Basisoccipital with first vertebral centrum incorporated. Parasphenoid somewhat angled posterodorsally, extending to neurocranial limit (shared with *Bullichthys*). Intercalar well developed, with triradiate wings, one of which contributes to the strong intercalar-prootic ridge and another that excludes the epitotic from the medial margin of the post-temporal fossa; intercalar-prootic ridge continues across prootic, curving above prominent foramina for posterior opening of pars jugularis and orbital artery to base of parasphenoid wing just above foramen for internal carotid artery (shared with *O. latifrons*). Subtemporal fossa very shallow. Prootic lateral margin to large posterior myodome strongly flared. Basisphenoid dorsally narrowed, angled anteroventrally (shared with *Bullichthys*) and with posteroventral base supported by slender vertical parasphenoid splint. Pterospheneid and upper part of posterior of orbitospheneid strongly sutured to deep ventromedial process of frontal. Orbitospheneid widely separated dorsally from frontal and penetrated anteriorly by large foramen for olfactory tract. Hyomandibular head broadly V-shaped and with shaft near vertical. Anterior vertebral centra with lateral surface deeply and irregularly pitted.

Description. A relatively large ?albuliform, probably approaching 0.4–0.5 m in length. Neurocranium relatively narrow but broader broader across autosphenotics than across posterior of otic region. Neurocranial roof flattened medially, curves gently ventrolaterally. In dorsal view, lateral margin gently convex from near front of orbit, with autosphenotic spines almost non-existent. Surface above braincase depressed, but accentuated through damage during fossilisation. Posterior of neurocranium deeply V-shaped. All preserved external bone surfaces ornamented by densely organised, low, irregular and interrupted ridges, also present along the anterodorsal margins of preoperculum and operculum, becoming more broadly

developed posterodorsally on latter. Above supraorbital sensory canals, surface slightly raised, with canals extending posteriorly into parietals. In lateral view, skull roof slightly arched above orbits and slightly depressed immediately posterior to centres of ossification of frontals.

Frontal large, solid, extending posteriorly to cover most of anterior of cranial vault, meeting counterpart medially along deeply interdigitated suture. Element firmly united with autosphenotic and pterotic laterally and parietal posteriorly. Lateral margin above orbit has swollen appearance and, from remaining portion of orbital margin, it appears that orbit not excessively large. Within orbit, ventral frontal surface bears prominent, deep, V-shaped process to interdigitate deeply with anterodorsal margin of pterospheneid and posterodorsal margin of orbitospheneid. Dorsal surface ornamented with low, irregular, interrupted but often anastomosing ridges. Part of a short, solid process of the lateral ethmoid firmly attached to the ventrolateral surface of frontal, curving anteroventrally to begin to define orbit.

Parietal, triradiate, long, apparently excluded from meeting all of its counterpart medially by insertion of dorsal wedge of the supraoccipital (very poorly present). Narrow anterior arm of parietal deeply sutured to frontal and pterotic; a lobate arm posterolaterally contributes the margin to the roof of the post-temporal fossa, while medial arm is short, meeting most of its counterpart along the medial suture. Because of its size, bone reduces size of pterotic laterally and contributes to posterolateral roof of opening of post-temporal fossa. Contact with epitotic posteriorly relatively long. Posterior of infraorbital sensory canal curves medially to within back of parietal.

Pterotic with relatively large dorsal expression but posteriorly narrow, extending from back of autosphenotic to contribute about one-third of dorsal roof of post-temporal fossa. Suture with parietal angles laterally within post-temporal fossa, excluded pterotic from dorsal margin of opening. Anterolaterally, pterotic roofs dilator

fossa and posterolaterally curves ventrally to posteroventral corner of post-temporal fossa. Lateral margin grooved, associated with unroofed otic sensory canal. Dilator fossa deep anteriorly and broadens medially above junction of sphenotic and pterotic; base of dilator fossa slopes dorsomedially and junction between sphenotic and pterotic widely cleft, leading to large foramen that appears to open into post-temporal fossa. Dilator fossa disappears posteriorly, well anterior to back of braincase. Lateral face of pterotic deeply shelved to provide posterior roof of dorsally curved two-thirds of hyomandibular facet. It also provides lateral margin of post-temporal fossa and expands medially within post-temporal fossa, curving to form much of its internal base. It continues to curve dorsomedially to meet epiotic along a dorsally curved suture but excluded from medial part of basal margin of post-temporal fossa by short, lateral wing of intercalar. Post-temporal fossa angled anteromedially and anteriorly appears to unite with counterpart.

Epiotic moderately large, narrowly meeting supraoccipital medially but with much greater contact with parietal; bone extends as short, broad dorsal development; posteriorly it meets exoccipital and vertical splint of intercalar and provides most of internal, medial wall of post-temporal fossa. Element precluded from most of inner margin of post-temporal fossa opening by intercalar and from its dorsolateral margin by parietal. Posterodorsal surface broadly shelved medially as epiotic buttress to support anterior of supratemporal and slopes anterodorsally above its contact with exoccipital. Posterior surface of skull slopes gently anteroventrally below epiotic buttress, with subepiotic fossa poorly developed.

Supraoccipital mostly unpreserved, small. From its scar, it appears to have extended onto dorsal neurocranial surface as small wedge but would only partially separate the parietals posteriorly (if at all) and forms medial part of remaining posterior V-shape of neurocranium. It slopes strongly anterodorsally from its ventral junction with exoccipital.

Exoccipital also poorly represented, especially in relation to dorsomedial corner of its posterior face. It is excluded from medial margin of post-temporal fossa by vertical splint of intercalar and meets epiotic along an angled ventromedial suture. It surrounds and meets counterpart along floor of large foramen magnum. Posterior surface slopes slightly anteroventrally below abruptly angled junction with supraoccipital and epiotic. Small foramen for occipital nerve present lateral to foramen magnum. Lateral face separated from posterior face by strong pedicle that broadens and flares ventromedially to be strongly sutured to basioccipital. Lateral junction with basioccipital broadly curved ventrally; anterior junction with prootic sinuous and that dorsally with intercalar short. A large foramen for nerve X present close to intercalar junction and that for nerve IX positioned immediately below.

Intercalar moderately large, triradiate element that caps ventromedial margin of post-temporal fossa. A narrow, vertical splint provides much of medial margin of post-temporal fossa; a short but broader wing interdigitates laterally with pterotic forming ventromedial margin of post-temporal fossa; larger medially directed portion supports exoccipital and anteriorly raises into a strong ridge that unites with a similar ridge from prootic to form prootic-intercalar ridge. Posteriorly, base of bone expands and strengthens into a strong, process that supported anteroventral arm of post-temporal.

Basioccipital has a fused vertebral centrum providing slightly ovate articulation with vertebral column, penetrated by a small foramen for the notochord; dorsally, it bears a pair of deep depressions for a detached neural arch. Junction with exoccipital and prootic along its lateral face is steeply angled anteriorly, where it remains slightly open. The surface steps medially subparallel to anterior margin. In ventral view, its lateral junction with parasphenoid, behind parasphenoid wing, somewhat sinuous and a medial splint of parasphenoid extends posteriorly to a foramen in advance of posterior margin into posterior myodome.

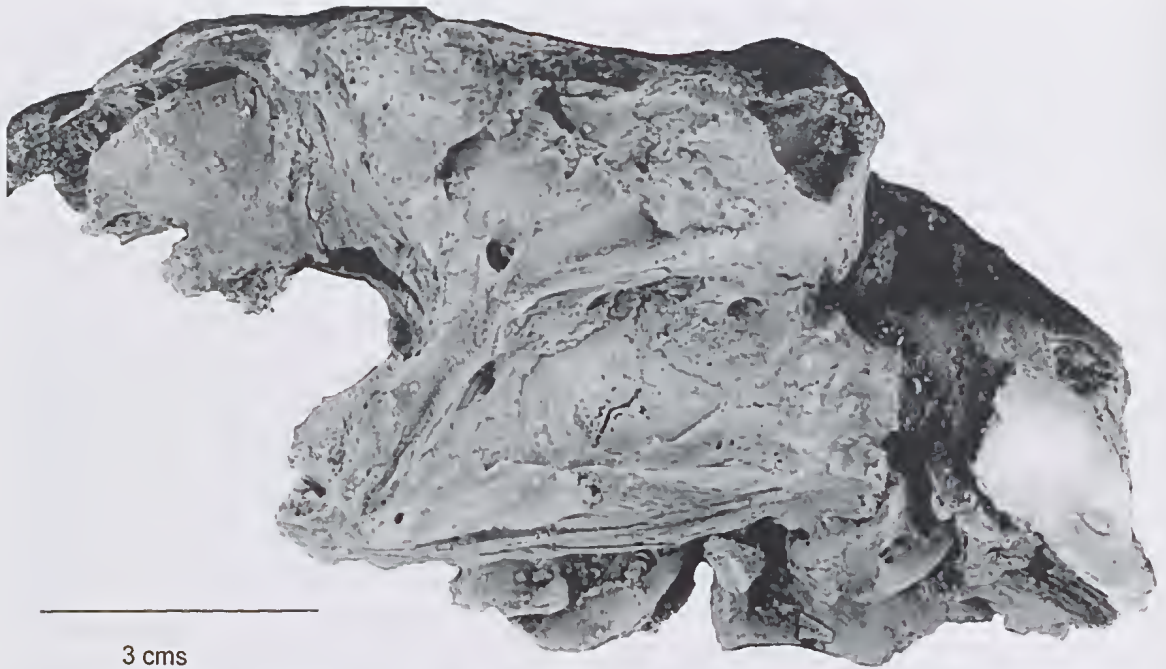


FIG. 6. *Stewartichtys leichhardti* gen. et sp. nov. Holotype, F 13861, left lateral view of partial neurocranium.

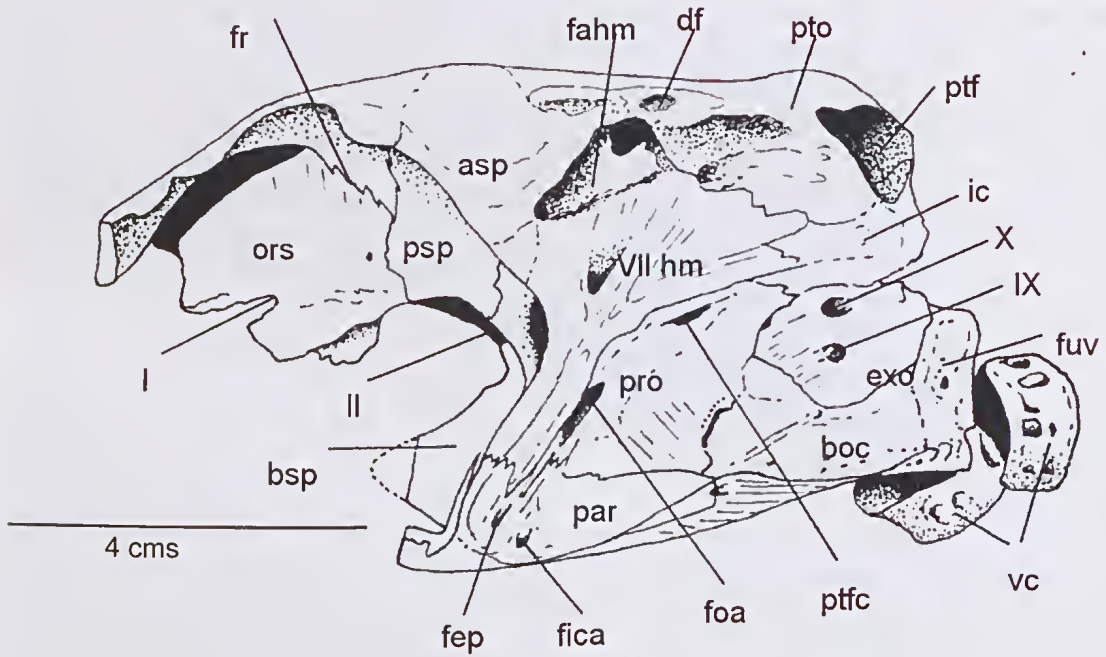


FIG. 7. *Stewartichtys leichhardti* gen. et sp. nov. Drawing of partial neurocranium of Holotype, F 13861, in left lateral view.

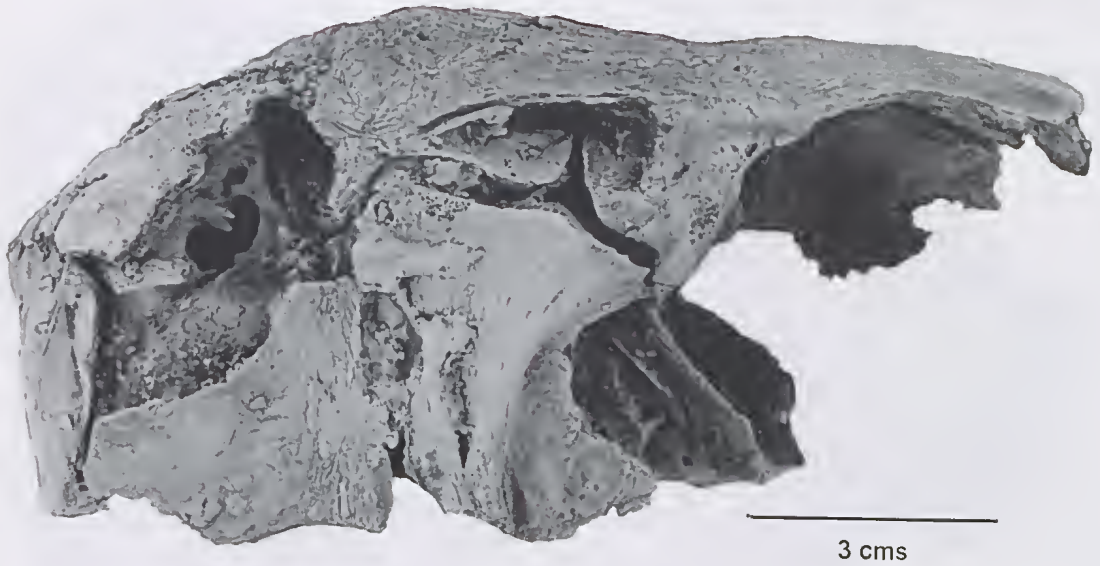


FIG. 8. *Stewartichtys leichhardti* gen. et sp. nov. Holotype, F 13861, right lateral view of partial neurocranium.

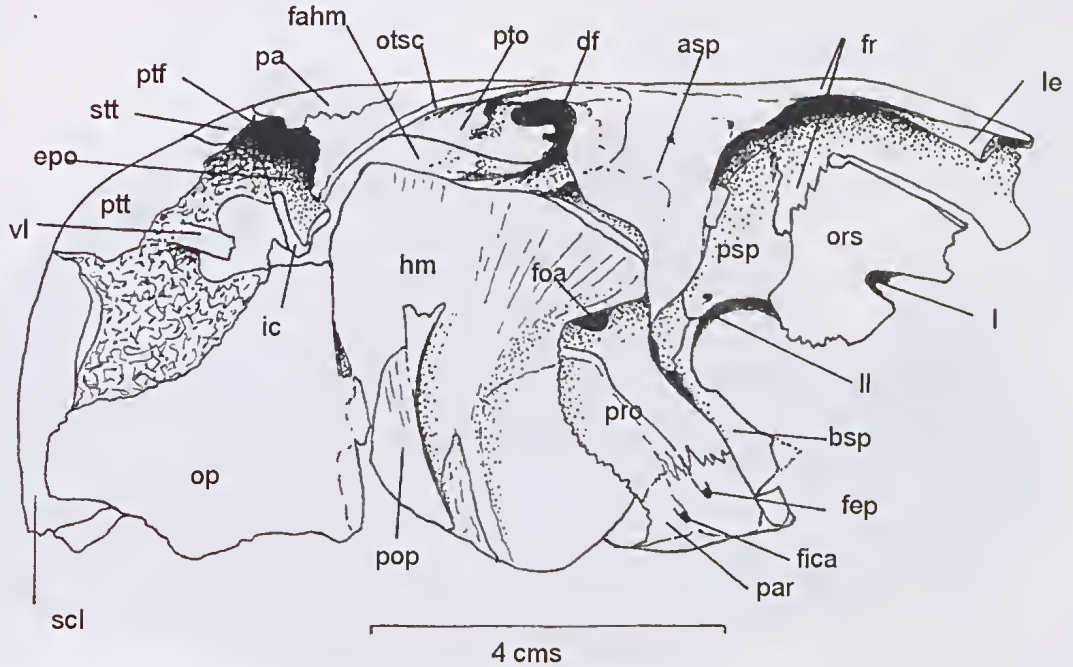


FIG. 9. *Stewartichtys leichhardti* gen. et sp. nov. Drawing of partial neurocranium of Holotype, F 13861, in right lateral view.

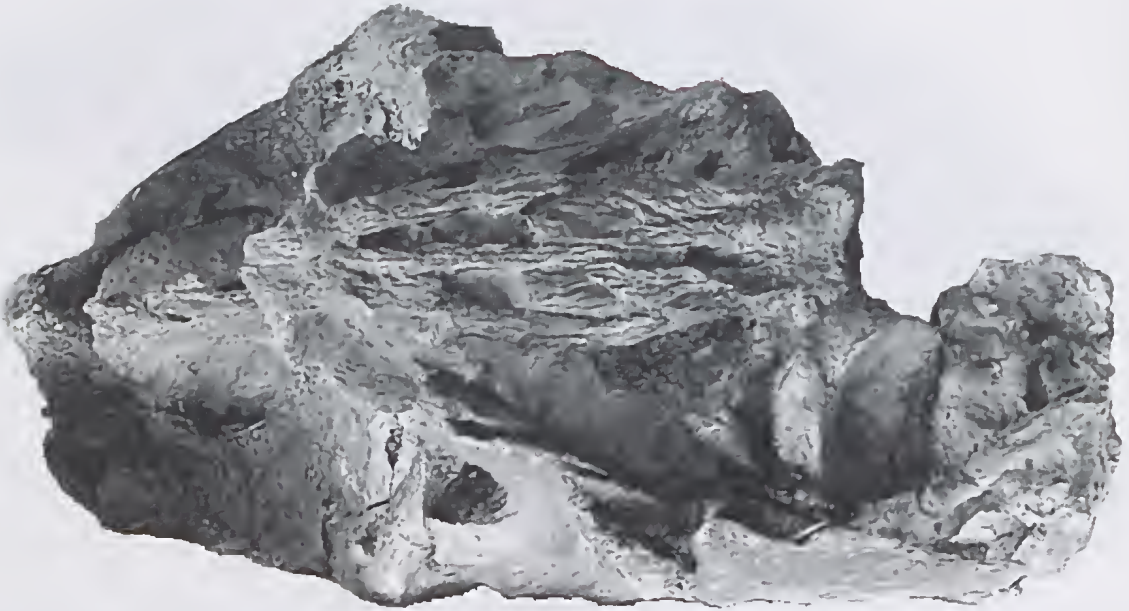


FIG. 10. *Stewartichthys leichhardti* gen. et sp. nov. Holotype, F 13861, ventral view of partial neurocranium.



FIG. 11. *Stewartichthys leichhardti* gen. et sp. nov. Holotype, F13861, dorsal view of partial neurocranium.

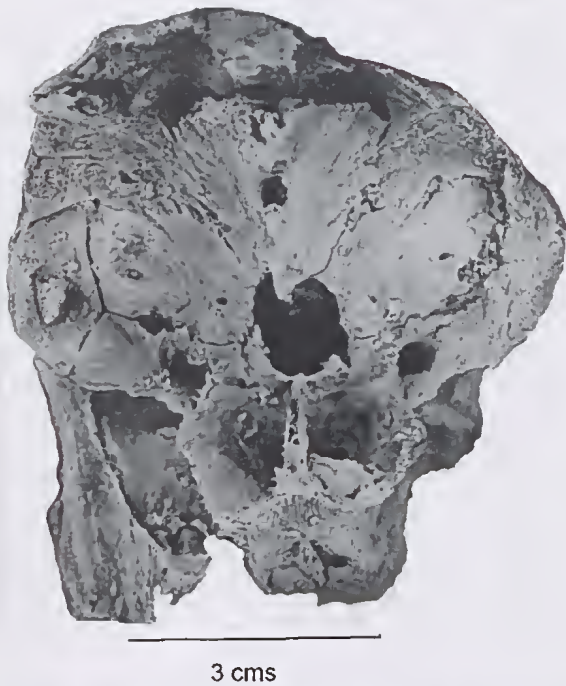


FIG. 12. *Stewartichthys leichhardti* gen. et sp. nov. Holotype, F 13861, orbital view of partial neurocranium.

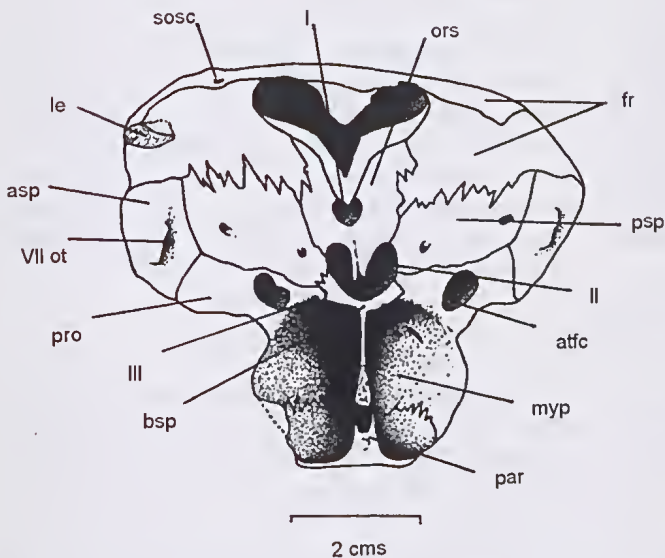


FIG. 13. *Stewartichthys leichhardti* gen. et sp. nov. Drawing of Holotype, F 13861, view of neurocranium, in orbital view.

Prootic large, forming much of anterior face of side of braincase. It contributes minimally to very poorly developed subtemporal fossa but provides floor of anterior of hyomandibular facet, meeting base of autosphenotic medially within facet. Its lateral junction with pterotic angles posteroventrally and continues cleft from base of dilator fossa across hyomandibular facet. A strong prootic-intercalar ridge extends anteriorly and reduces slightly before curving abruptly anteroventrally to near base of parasphenoid wing. Two large foramina occur immediately below this ridge, the most anterior for the orbital artery, while the other appears for elongated pars jugularis. A large foramen, possibly for the hyomandibular trunk of the facial nerve exists anterodorsal to prootic-intercalar ridge. Anterior face of prootic forms part of posterior of orbit. Lateral rim of entrance to posterior myodome widely flared. Prootic excluded from optic foramen by upper wing of basisphenoid. Face of bone penetrated by two foramina; largest and more laterally positioned for anterior opening of pars jugularis and smaller one, close to the suture with the basisphenoid, is believed for oculomotor nerve. Former has a broad groove passing vertically onto surface of pterosphenoid and probably accommodated the superficial ophthalmic branches of trigeminal and facial nerves. Foramina present in the medial wall of the pars jugularis, believed for passage of trigeminal and facial nerves. Prootic ridge penetrated by a number of foramina. Otic bulla development is weak.

Sphenotic caps posterodorsal corner of orbit, and lacks any sphenotic spine development. Dorsal surface expression limited. Anterior face bears a rounded knob and has a small foramen for otic ramus of nerve VII. Sphenotic joins pterosphenoid anteriorly and

ventrally meets prootic. Surface broadly and convexly rounded posteroventrally as anterior articulating surface for hyomandibular, with its dorsal edge forming back of open cleft in base of dilator fossa. Posterodorsally, it forms anterior of dilator fossa.

Pterosphenoid large, loosely abutting sphenotic, prootic and orbitosphenoid and strongly sutured to deep, strong, ventral V-shaped process of frontal. Anterodorsal margin slightly fluted, penetrated by two foramina. Posterior foramen positioned below superficial orbital groove probably for anterior cerebral vein while dorsal foramen probably for trochlearis.

Basisphenoid in anterior view has basal, medial stem supporting two, broadly U-shaped dorsal wings. Stem deep and narrow but expanded anteroventrally above parasphenoid. Wings sutured along prootic at posterolateral margin of opening for orbital tract and extend minimally along the internal corner of pterosphenoid. Base of stem separated from top of parasphenoid but probably connected it with cartilage. Stem with shallow groove paralleling back towards base, accommodating fine splints of bone from parasphenoid.

Orbitosphenoid moderately large, separated dorsally from frontal by large gap. Posterodorsally, a strong interdigitated suture links it to large, ventral, V-shaped process of frontal; posteriorly a looser junction exists with pterosphenoid. Posteroventral margin irregular, suggesting presence of a partial, cartilaginous, interorbital septum. A large foramen for olfactory tracts present in middle of anterior margin.

Parasphenoid largely missing but sloped gently posterodorsally. Parasphenoid ascending wings present, broadly but only weakly developed, ascending at a high angle and forming posteroventral part of flared opening to posterior myodome. Lateral base of ascending wing pierced by a foramen for internal carotid artery and, anterodorsal to this by a small foramen for efferent pseudobranchial artery. Posterior of bone strengthened dorsally by deep, longitudinal, lateral margins and a longitudinal, medial strut but surface has largely been

lost. Apparently, bone extended to posterior of basioccipital. No parasphenoid teeth are present in the minimal remains preserved.

Supratemporal incomplete but apparently relatively large. It does not appear to have met its counterpart on the other side.

Post-temporal very incomplete but linked to intercalary by a thin, strut-like ventral limb.

Hyomandibular only partially preserved and represents only element of hyopalatine bones preserved. Bone broad with a large head broadly V-shaped but with single, continuous, articulating surface. Lateral surface with a strong, broad ridge curving from anterior part of head towards shaft. Posterior margin strongly curved anteroventrally and bearing a stout but very short opercular process. Median ridge running down length of shaft very strong, while anterodorsal flange thin with a rounded ventral margin. Extent of overlap by the metapterygoid unknown.

Opercular series very incompletely known, with anterodorsal margin of operculum nearly vertical. Only dorsal tip of preoperculum present.

Three vertebral centra preserved. First ovate, being broader than deep but centra become rounder in section by third bone. Length of centra is shorter than deep. With exception of first centrum, others bear autogenous parapophyses for pleural ribs. Deep, large, depressions exist dorsally for neural spines but depressions for haemal spines lacking. Laterally, centra marked by deep, irregular but generally large fenestrations.

DISCUSSION

Both *Marathonichthys* and *Stewartichthys*, are considered referable to the Elopomorpha on the basis of their overall morphology. Mayrinck *et al.* (2010), in describing the albuliform, *Bullichthys santanensis* from the Romualdo Member of the Santana Formation, in northeastern Brazil (generally considered to be of Albian age) concluded that most of the characters that define the Elopomorpha are not represented in

fossil species, as they are based on soft tissue, or on elements that are not often preserved. Forey *et al.* (1996) identified three characters supporting elopomorph monophyly. These are an enclosed ethmoid commissure within the premaxilla, the rostral ossicles and the presence of a pectoral splint. These characters are either not preserved or not present in either *M. coyleorum* or *S. leichhardtii*. The presence of a pectoral splint was evident in *B. santanensis*.

In considering the ordinal position of *Marathonichthys* and *Stewartichthys*, fewer potentially relevant characters are preserved in *M. coyleorum* than are present in *S. leichhardtii*. Morphologically, the two taxa differ markedly from one another. Forey *et al.* (1996) suggest that a number of Lower Cretaceous plesions may be stem group albuloids. Subsequently described plesions could also be similarly considered. Figures 1-2 illustrate the neurocranial remains preserved in the holotype of *M. coyleorum*, while Figures 3-4 illustrate partial reconstructions, taking account of the dorsoventral crushing of the specimen. The orbitosphenoid and associated ossified septum is more extensively developed in *M. coyleorum* than that in *S. leichhardtii* and the dorsal surface of the neurocranium is very different, being much broader and shallower posteriorly, narrowing abruptly anteriorly beyond the orbits (Figures 1, 3 and 5E). The neurocranial roof in *S. leichhardtii* is relatively broad but does not appear to narrow as markedly (Figure 5D). The parietals are separated or partially separated in both new taxa by a short dorsal expression of the supraoccipital (Figures 1, 3, 5D, E) but that in *Stewartichthys* does so minimally or may even be excluded, as evidenced by the space left by loss of the bone. Both species also possess poorly developed subepiotic and subtemporal fossae, have a weakly developed bulla containing the saccolith and a moderately developed intercalar that contributes to a prominent intercalar-prootic bridge (as in *M. coyleorum*) or ridge (seen in *S. leichhardtii*), as seen in Figures 3 and 6-7. Both have post-temporal fossae that are angled anteromedially but that in *S. leichhardtii* has a much larger posterior opening. The sphenotic spine in *M. coyleorum* is better developed, while

S. leichhardtii has a much better developed, deeper dilator fossa (Figures 8-9). Both genera are nonetheless considered more reasonably referable to the Order Albuliformes *sensu* Forey *et al.*, 1996 than to the Elopiformes on gross morphological grounds, taking account of Forey's (1973) albuloid diagnosis. However, on this basis, comparison with the extant albuloid, *Albula* Linnaeus, the skull of which was described by Ridewood (1904) and redescribed by Forey (1973), together with the eurokid *Euroka* Bartholomai, 2010 and the plesion *Osmeroides* indicates that *Marathonichthys* has some features (e.g. skull shape and anterior parasphenoid development) that overlap with the Elopiformes (Figure 5 for dorsal skull shape comparisons).

Morphological comparisons yielding a mixture of similarities and differences can be made between the new Queensland taxa and the neurocrania of fossil albuliform plesions, *Brannerion* (see Blum 1991) and *Paraclops* (see Maisey & Blum 1991), *Bullichthys* (Mayrinck *et al.* 2010), *Bangeichthys* (see Filleul 2000), *Osmeroides* (Forey 1973) and *Euroka* (see Bartholomai 2010a). *Marathonichthys* and *Stewartichthys* differ sufficiently from these to justify their description as new species (see diagnoses above).

Figures 3 and 4 present reconstructions that attempt to correct the distortions evident in the holotype of *M. coyleorum* in dorsal, ventral and posterior views and to add the slight marginal neurocranial bone that was lost. The species does present features that make it difficult to relate it firmly to either of the recognised families within the Albulioidei. The elongated snout and more triangular overall shape in dorsal view, together with the nearly completely uncovered supraorbital sensory canals and expansive, unseparated development of the parietals in the extant and fossil members of the Family Pterothrissidae (see Forey, 1973 for revisions and figures of pterothrissids) makes it difficult to seriously consider its reference to that family. Dorsal neurocranial roof shape is more like that in the Family Albulidae, as are the posteriorly more covered supraorbital sensory canals and much smaller, separated parietals (Figure

5A). The poor development of subepiotic and subtemporal fossae and otic bulla, the almost horizontal nature of the lateral surface of the cranial vault, the expanded orbitosphenoid/orbitosphenoid septum, the relatively strong prootic-intercalar bridge, the edentate and relatively narrow, mid-anterior area of the parasphenoid, the dorsal development of the supraoccipital (at least in *M. coyleorum*) and the very coarse posterodorsal ornamentation of the cranium represent a mix of characters that nonetheless suggest that reference to the Albulidae would be difficult to justify. Similarly, although the development of the posterior of the neurocranium is similar to that in the eurokid, *Euroka* (in the transverse subdivision of the subepiotic fossa and separation of small, lozenge-shaped parietals by a dorsal expression of the supraoccipital), the subtriangular dorsal outline, dorsal ornamentation and the nature of the parasphenoid (Bartholomai 2010a) readily separates them on the basis of characters represented in both. The deeper, narrower and ornamented neurocranium in *S. leichhardtii* is similarly different from that in *Euroka*. *Stewartichthys*, illustrated in Figures 6-13, 5D differs from the Albulidae in having its neurocranial roof narrower posteriorly than across the sphenotics, in lacking sphenotic spines, in possessing very reduced subtemporal and subepiotic fossae and in having a strong prootic-intercalar ridge that extends across the prootic to the base of the parasphenoid wing. It has the dilator fossa shortened, and deepened, with a deeply cleft base and with the base of the prootic widely flared lateral to the opening of the posterior myodome.

Baugeichthys caeruleus from the Lower Cretaceous (Hauterivian) of France, is the earliest known fossil albuliform (Filleul 2000), slightly predating the Queensland taxa. Few of the characters considered diagnostic are present in the new Queensland taxa. It differs markedly from *Marathonichthys* by having its snout appearing relatively shorter (but the snout in *Stewartichthys* was most likely shortened). Further, the parasphenoid in *B. caeruleus* has expanded lateral wings under the orbit, the parietals are much larger and meet along a

full length midline suture, differing from possible partial medial separation of parietals in *S. leichhardtii* and their full separation by the superoccipital in *M. coyleorum*. The dorsal neurocranial bones appear unornamented (see Filleul, 2000, figure 6). Also unlike *S. leichhardtii*, supraorbital sensory canals do not extend onto the parietals and the roof of the cranial vault is broadened. The Santana albuliform, *Bullichthys santanaensis*, described by Mayrinck *et al.*, (2010) differs from *M. coyleorum* and *S. leichhardtii* in having a strongly developed subtemporal fossa and otic bulla and a small intercalar. It lacks an orbitosphenoid septum (as in *Stewartichthys*). The parasphenoid is pierced by a foramen, probably for the efferent pseudobranchial artery in both *Bullichthys* and *Stewartichthys* and a Y-shaped basisphenoid and shallow subepiotic fossa are present in both. However, an intercalar-prootic bridge present in *Bullichthys* is only present in *Marathonichthys*, being extended in *Stewartichthys* as an intercalar-prootic ridge that curves across the prootic to the base of the parasphenoid wing and parasphenoid dentition is absent. Mayrinck *et al.* (2010, fig. 1) lists *Paraelops*, *Brannerion* and *Bullichthys* from the Santana Formation of Lower Cretaceous (Albian) age in Brazil as *Albuloidei incertae sedis*. *Paraelops* has been redescribed by Maisey and Blum (1991), while *Brannerion* has also been redescribed by Blum (1991). The former taxon differs from *M. coyleorum* in having a much deeper braincase. It differs from both new taxa in having the parietals about three times longer than wide (Figure 5G), with the pterotic large and L-shaped; extremely deep subtemporal and subepiotic fossae are present; an intercalar-prootic bridge is lacking (present in *M. coyleorum*). *Brannerion* differs from *M. coyleorum* in having a blunt snout, a much narrower, unornamented, convex dorsal surface to the neurocranium, a much deeper brain case and a broad, toothed, parasphenoid tooth plate. The neurocranium in *S. leichhardtii* is relatively narrower across the otic region than in *Brannerion* and has a posterodorsally narrow development of the pterotic. *Stewartichthys* has large, triradiate parietals and has much larger intercalars than those noted by Maisey

and Blum (1991) for *Brauerion*, although these authors noted that the intercalar is not as reduced in *Brauerion* as in other “albuloids” and that the intercalar bridge to the prootic persists (similar to the intercalar development in *Marathonichthys*).

Forey (1973) indicates that coarse rugae are present on the roofing bones of the skull of *Dinelpops ornatus* Woodward, 1907, from the Upper Cenomanian of southeastern England, and that the frontals narrow rapidly in front of the orbits, apparently basically similar to *Osmeroides latifrons* and *M. coyleorum* but differing from *S. leichhardti*. Unfortunately, this taxon was not illustrated. A shallow depression medially above the cranial vault, similar to that in the holotype of *S. leichhardti* (accentuated in this by crushing) is described as present in *D. ornatus*. Forey (1973) indicates that the rugae of the roof of the cranial vault continue anteriorly onto the dermethmoid in *D. ornatus* and that a medial branch of the supraorbital sensory canal, unlike that in *Marathonichthys*, opens apparently further back on the frontal at the posterior of the orbit.

The posterior of the neurocranium of the Toolebuc albuliform, *Euroka dunravenensis*, possesses some characters that are similar to those in *M. coyleorum*. Both have very broad, flat, neurocranial roofs, with the parietals separated by a dorsal expansion of the supraoccipital and both are shallow in the otic region. Both have a shallow subepiotic fossa subdivided into upper and lower moieties by a transverse ridge. *Euroka*, however, has an almost unornamented cranial dorsal surface and is more angular posteroventrally (Figure 5F). Its dilator fossa is much deeper anteriorly, the anterior of the hyomandibular facet is less emphatically defined, the intercalar is larger with a less well-defined intercalar-prootic ridge, the parasphenoid terminates posteriorly in stout, blunt prongs, well before the posterior of the basioccipital and there is a thickened and very stout orbitosphenoid interseptum (Bartholomai 2010a). The frontals are broadened well anterior to the orbits before narrowing to unite with the broadened posterior of the dermosphenotic (Figure 5F). Fortunately, sufficient differences also exist

in the areas preserved in *Stewartichthys* to separate it from *Euroka* without needing to include comparisons with that taxon’s highly specialised morphology of the hyopalatine area, the anterior of the neurocranium and mandible. The triradiate parietals and their possible near separation, the narrower and ornamented neurocranial roof, deeper otic region of the skull and lack of an ossified orbitosphenoid septum are morphological features in *S. leichhardti* that are lacking in *Euroka*.

The species of the genus *Osmeroides*, also considered by Mayrinck *et al.* (2010) as Albuliformes *incertae sedis sensu* Forey *et al.* (1996), are all from sediments younger than the Toolebuc Formation. Forey (1973) concluded that *Osmeroides* belonged within a separate family, the Osmeroididae but later, the genus was referred as a plesion of the Albuliformes, along with *Brauerion* by Forey *et al.* (1996). *Osmeroides* is recorded by Forey (1973) from southern England in sediments extending from the Lower Cretaceous (Albian) to the Upper Cretaceous (Coniacian). *Marathonichthys coyleorum* has stout and heavy dermal bones of the cranium and a flat cranial roof similar to that in *Osmeroides*, with the dilator roofed by the pterotic but with a narrower, edentulous parasphenoid. The lateral ethmoid appears to have been connected to the parasphenoid, as in *Osmeroides* but this may be related to dorsoventral crushing. The brain case appears to have been much shallower. The short, separated, lobate parietals differ markedly from those in *Osmeroides* (Figures 5B–C), although, as described by Forey (1973), the dermal bones in *O. lewesiensis* have prominent, coarse, radiating ornamentation. Orbitosphenoid ossification in *O. lewesiensis* is extensive (but includes the interorbital septum as in *Marathonichthys*). The distribution of elements on the dorsal cranial surface is similar to those in *M. coyleorum* but the Queensland species has a very small subtemporal fossa, much heavier ornamentation of the posterior dorsal neurocranial surface and lacks both an expanded otic bulla and has a considerably narrower, edentate parasphenoid. An incipient prootic-exoccipital bridge (rather than a ridge) exists in *O. latifrons*. *Stewartichthys leichhardti* has

many morphological similarities to the species of *Osmeroides* revised by Forey (1973) but differs from the generic diagnosis for *Osmeroides* in having a more complex and larger intercalar and in lacking villiform teeth on the preserved part of the parasphenoid. At the specific level, *S. leichhardtii* was probably of similar size to *O. lewesiensis* but larger than the other *Osmeroides* species. Its parietals are triradiate, not rectilinear and had possible short medial contact with the supraoccipital that apparently partially separates them. Dorsal surface ornamentation is present, as in *O. lewesiensis*, and the parasphenoid is similarly extended to the rear of the neurocranium. However, an ossified interorbital septum is absent and the sphenotic spines are not developed. Compared with *O. levis*, also revised by Forey, 1973, the dorsal shape of the neurocranium is similar but the Queensland taxon is much larger and the surface ornamentation is much more strongly developed. The interorbital septum in *O. levis* is partially ossified, the posterior of the parasphenoid ends under the mid-otic area and the parietals are rectangular and are not separated by any of the supraoccipital. The parietals in *O. latifrons* are more lobate than in the other English taxa but are not separated by the supraoccipital and are not triradiate as in *S. leichhardtii*. Dorsal ornamentation of neurocranial bone is much less developed than in *S. leichhardtii* but lack of an ossified interorbital septum is similar, as is the posterior extent of the parasphenoid. Width of the parasphenoid and expansion of the otic bulla in *S. leichhardtii* is considerably less than in *O. latifrons*. The lateral surface of the braincase in *S. leichhardtii* is similar to those in the larger English species with the extension of the prootic-intercalar ridge angled across the prootic to the base of the lateral wing of the parasphenoid, although the subtemporal fossa is much less developed.

The Lower Cretaceous (Late Albian) marine epicontinental sediments of the Eromanga Basin generally have increasing importance in adding to the recorded knowledge of the early teleosts in the southern hemisphere. The stem-lineage ichthyodectiform teleosts from the Toolebuc Formation, including *Cooyoo*

australis, revised by Lees and Bartholomai (1987), was included in work by Calvin *et al.* (2013). It was suggested that the radiation of *Cooyoo* and the Mexican *Unamichthys* was as a lineage of sister genera, a relationship that is difficult to interpret palaeogeographically. Because of Australia's isolation, Calvin *et al.* (2013) suggested that the relationship reflected dispersal events around the Southern Atlantic and/or the Tethys. However, they suggest that the sister group relationship evidence was acknowledged as weak and may have influenced the distributional interpretation. Similar problems appear to apply to relationships and distributions within the known pelagic Albian albuliforms.

The current study broadens understanding of fossil elopomorphs by expanding recognition of an increased bony fish diversification from a part of the oceanic world not generally included in the major interpretative work undertaken to this time. *Marathonichthys* presents a range of characters that are more comparable with those in the living albuloids, while *Stewartichthys* has more general similarities with Santana taxa such as *Bullichthys* and *Brauneri* and even with the English *Osmeroides*. It is hoped that future finds will provide detail of the skeletons of the Eromanga Basin species to help clarify their phylogenetic relationships. Features in *Marathonichthys* suggest tantalising possible qualitative similarities, broadly including *Albula*, while major differences in *Stewartichthys* indicate morphological divergence from the general evolutionary interpretation of the albuliformes. *Marathonichthys* and *Stewartichthys* lived in the Eromanga Basin at a time when, at least during deposition of the Toolebuc Formation under the layered epeiric marine sea that exhibited dysoxic to anoxic conditions (Cook *et al.* 2013). This suggests that open water, pelagic fish species would dominate in the fauna.

Some isolation was possibly a factor in the evolution of the species present, although Kear (2003) suggests that Australian Cretaceous shelf deposits appear to produce some similar pelagic taxa. Marine conditions prevailed for approximately 26 MY in the Eromanga Basin. Cook *et al.* (2013) indicate that marine

sediments were deposited through most of the Early Cretaceous with terminal paralic, fluvial and lacustrine conditions in the effective regression of the Early Cretaceous extending into the early Late Cretaceous (Cenomanian). It is believed that limitations to augmentation of the gene pool across the Euroka Arch and existence of new palaeoecological conditions would have promoted at least some differing evolutionary trends inside the Basin from those existing beyond the Australian continent, where there was ready access to wide oceanic gene pools. For this reason, description of the new genera and species adds breadth to knowledge of the early but probably localised diversification of the group and is in keeping with the development of much more specialised morphological characters seen in the albuliform, *Euroka dunravenensis*, also from the Toolebuc Formation of the Eromanga Basin (Bartholomai 2010a).

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New species and records of the molycriine ground spider genus *Wydundra* (Araneae: Prodidomidae) from northern Australia

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ABSTRACT

Five new species of the molycriine prodidomid genus *Wydundra* are described: *W. camooweal*, *W. leichhardti*, *W. chillagoe*, and *W. gilliat* from northern Queensland, and *W. alexandria* from the Northern Territory. Several new species groups are established within the genus, and new records are provided for nine previously described species. □ *Molycriinae*, *Prodidomidae*, *Wydundra*, *ground spiders*, *Queensland*, *Northern Territory*.

The ground spider family Prodidomidae currently contains 304 species placed in 31 genera (Platnick 2013). Seven of those genera, and 137 species, occur in Australia (Platnick & Baehr 2006). Three subfamilies are recognized: the Prodidominae, Theuminae, and Molycriinae (Platnick 1990; Platnick & Baehr 2006). Most of the Australian prodidomids belong to the Molycriinae, and can easily be recognized by their greatly elongated anterior lateral spinnerets, which originate far in advance of the other four spinnerets (Platnick & Baehr 2006: figs 12–17). Outside Australia, only five molycriine species are known: *Wydundra voc* (Deeleman-Reinhold, 2001), recorded only from Perhentian Island off the east coast of Malaysia and Lonthoir Island in the Moluccas, and four species from Namibia and Angola assigned to *Namundra* Platnick & Bird (2007).

The most diverse of the molycriine genera is *Wydundra* Platnick & Baehr, 2006, which (aside from *W. voc*) currently includes 40 species found throughout Australia (except for Victoria and Tasmania), all of which were first described by Platnick & Baehr (2006). These relatively large animals are characteristic elements of the north-

ern Australian spider fauna, and it is therefore fitting that we present an update to our knowledge of them in this volume celebrating the bicentenary of Ludwig Leichhardt, a pioneer in the biological exploration of northern Australia.

MATERIAL AND METHODS

Specimens were collected with pitfall traps on Queensland Museum Expeditions to the Gulf of Carpentaria conducted by Robert Raven, Senior Curator at the QM, from June–September 2006, and to northern Queensland conducted by Geoff Monteith from September 2006–February 2007.

All specimen measurements are in millimeters, but users should note that in gnaphosids size is not a useful character, as some specimens can be twice the size of their conspecifics; scale bars are therefore not included for the illustrations, as only the shape differences depicted there are biologically and taxonomically relevant. All specimens are deposited in the Queensland Museum (QM). The format of the descriptions follows that of Platnick & Baehr (2006), and standard abbreviations of morphological terms follow those of Platnick &

Shadab (1975); the anterior lateral spinnerets are abbreviated as ALS. Eight informal species groups are newly established here; they encompass most, but not all, of the described members of the genus.

SYSTEMATICS

Family PRODIDOMIDAE Simon, 1884

Subfamily MOLYCRIINAE Simon, 1897

Wydundra Platnick & Baehr, 2006

Wydundra Platnick & Baehr, 2006: 106 [type species by original designation *Wydundra osbourne* Platnick & Baehr, 2006].

Diagnosis. Members of *Wydundra* can easily be separated from the other molycriines by their widely separated anterior lateral spinnerets (Fig. 1C; Platnick & Baehr 2006: fig. 13), which are separated at their base by at least their diameter (and often by two or more times their diameter), and usually (but not always) by the presence of extremely tiny denticles on the lateral margins of the carapace (Fig. 1A, B; Platnick & Baehr 2006: fig. 6).

THE WYDUNDRA OSBOURNE GROUP

This group contains those species described by Platnick & Baehr (2006) in which the epigynum has a pair of anteriorly directed projections: *Wydundra osbourne*, *W. fitzroy*, *W. windsor*, *W. percy*, *W. gully*, and *W. newcastle* from Queensland, *W. carinda* from New South Wales and South Australia, *W. gunbiyarrmi* and *W. jabiru* from the Northern Territory, and *W. solo* and *W. drysdale* from Western Australia, plus the new species *W. camooweal*, *W. leichhardt*, and *W. alexandria*.

Wydundra osbourne Platnick & Baehr, 2006

Wydundra osbourne Platnick & Baehr, 2006: 111, figs 248–252 [type locality, Osbourne Mines, Queensland].

Material examined. NORTHERN TERRITORY: QM-S81180, ♂, Tablelands Highway, near One Mile Creek, 17°30'25.8"S, 135°40'10.0"E, 283 m, R. Raven, B. Baehr, A. Amey, 8 Jul–22 Sep 2006, pitfall. QUEENSLAND: QM-S81198, ♂, 10 km E Camooweal by road, 19°55'09.3"S, 138°12'30.0"E, 252 m, R. Raven, B. Baehr, A. Amey, 30 Jun–9 Sep 2006, pitfall; QM-S81184, ♀, Leichardt Falls, E on Burketown–Normanton Road, at radio tower, 18°09'14.2"S,

140°05'47.4"E, 62 m, R. Raven, B. Baehr, A. Amey, 5 Jul–12 Sep 2006, pitfall; QM-S81207, ♂, Riversleigh D site, 18°59'24.7"S, 138°40'58.9"E, 159 m, R. Raven, B. Baehr, A. Amey, 1 Jul–10 Sep 2006, pitfall; QM-S81200, ♂, S81201, ♀, 5 km W Riversleigh turnoff on Gregory Downs–Camooweal Road, 19°07'25.9"S, 138°57'10.6"E, 182 m, R. Raven, B. Baehr, A. Amey, 1 Jul–10 Sep 2006, pitfalls; QM-S81183, ♂, ♀, 1 km S Wills Road, Gregory River gate turnoff, 18°36'02.9"S, 138°35'36.3"E, 126 m, R. Raven, B. Baehr, A. Amey, 2 Jul–11 Sep 2006, pitfall.

Distribution. Previously known only from mid-western Queensland; the new records indicate that the range extends into north-western Queensland and eastern parts of the Northern Territory.

Wydundra windsor Platnick & Baehr, 2006

Wydundra windsor Platnick & Baehr, 2006: 113, figs 257–261 [type locality, Windsor Tableland, Queensland].

Material examined. QM-S81354, ♀, Lolworth National Park site 2, Qld, 19°49.7'S, 146°05.4'E, 270 m, QM group, 28 Sep–12 Dec 2006, pitfall, dry vine scrub; QM-S76836, ♂, Toomba site 2, Qld, 19°58.0'S, 145°34.8'E, 400 m, G. Monteith, D. Cook, 15 Dec 2006–13 Feb 2007, pitfall, vine scrub on basalt.

Distribution. Known only from north-eastern Queensland.

Wydundra percy Platnick & Baehr, 2006

Wydundra percy Platnick & Baehr, 2006: 117, figs 262–266 [type locality, South Percy Island, Queensland].

Material examined. QM-S81202, ♀, Blackwood NP, Qld, 21°28'03.5"S, 146°40'55.8"E, 239 m, R. Raven, B. Baehr, A. Amey, 14 Jul–29 Sep 2006, pitfall; QM-S81169, ♀, Mazeppa National Park site 4, Qld, 22°16'23.7"S, 147°15'50.6"E, 249 m, R. Raven, B. Baehr, A. Amey, 14 Jul–29 Sep 2006, pitfall.

Distribution. Known only from mid-eastern Queensland.

Wydundra camooweal sp. nov.

(Fig. 4A, B)

Material examined. HOLOTYPE: QM-S81187, ♀, Camooweal, NE at first floodway on Gregory Downs–Camooweal Road, Qld, 19°47'38.3"S, 138°12'03.5"E, 252 m, R. Raven, B. Baehr, A. Amey, 30 Jun–23 Sep 2006, pitfall. OTHER MATERIAL: QM-S75268, ♀, same data as holotype; QM-S81208, ♀, just NW Burke Developmental Road, at 1st jumpup, Qld, 19°02'54.7"S, 140°24'41.6"E, 61 m, R. Raven, B. Baehr, A. Amey, 2 Jul–11 Sep 2006, pitfall.

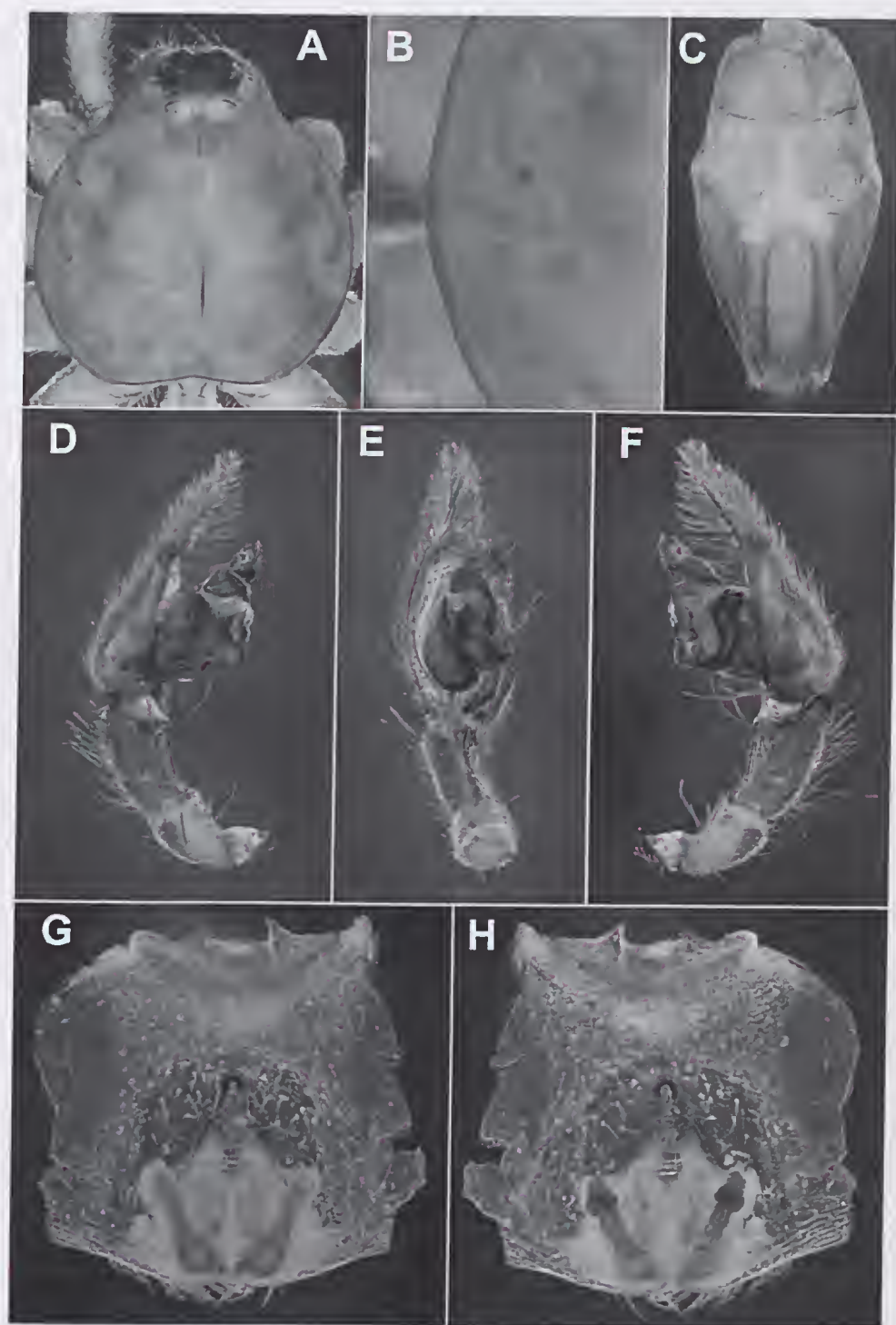


FIG. 1. *Wyndundra leichhardti* sp. nov., male (A-F) and female (G-H). A, carapace, dorsal view; B, lateral margin of carapace, dorsal view; C, abdomen, ventral view; D, left palp, prolateral view; E, same, ventral view; F, same, retrolateral view; G, epigynum, ventral view; H, same, dorsal view.

Diagnosis. Females resemble those of *W. percy* in having relatively wide anteriorly directed projections on the epigynum but have those projections much farther from the anterior epigynal margin (Fig. 4A).

Description. *Male* unknown. *Female.* Total length 2.58. Carapace 0.98 long, 0.88 wide, cl/cw 1.11, 0.26 high; sternum 0.56 long, 0.52 wide, sl/sw 1.08; abdomen 1.60 long, 0.94 wide; coxa I 0.60 long; relative length of coxae I–IV 1.00:1.00:0.87:1.20. Prosoma, legs orange; endites, labium distally pale; abdomen gray, venter pale. AME large, elevated, PME largest, egg-shaped; eye group width 0.68 of caput width; AME 0.17; ALE 0.16; PME 0.22; PLE 0.16; AME-AME 0.04; AME-ALE 0.04; PME-PME 0.06; PME-PL 0.04; ALE-PL 0.04; eye group AME-PME 0.42; AME-AME 0.38; PME-PME 0.5. Clypeus 0.08 high. Abdomen covered with dark gray recumbent scales; ALS 0.34 of abdominal length, more than their diameter apart. Female palpal femur with 4–7 strong, ventral setae. Epigynum (Fig. 4A, B) with inverted v-shaped anterior epigynal hood; anterior margin wide; posterior margin with short, triangular, anteriorly blunt projections; epigynal ducts coiled; spermathecae less than their diameter apart, globular.

Etymology. The specific name is a noun in apposition taken from the type locality.

Distribution. Known only from north-western Qld.

Wyndundra newcastle Platnick & Baehr, 2006

Wyndundra newcastle Platnick & Baehr, 2006: 127, figs 287–291 [type locality, Newcastle, Queensland].

Material examined. QM-S76724, ♂, Footprint Scrub site 1, Qld, 19°41.3'S, 146°26.4'E, 320–363 m, G. Monteith, D. Cook, 8 Dec 2006–10 Feb 2007, pitfall, vine scrub; QM-S81345, ♀, Gregory Development Road, 1.5 km E Marble Creek, Qld, 19°06.2'S, 145°16.6'E, 456 m, QM party, 27 Sep–17 Dec 2006, pitfall, open forest; QM-S76713, Rochford Scrub site 3, Qld, 20°07.0'S, 146°37.8'E, 280 m, G. Monteith, D. Cook, 11 Dec 2006–11 Feb 2007, intercept trap, lancewood/bendee vine scrub.

Distribution. Known only from northern Qld.

Wyndundra leichhardtii sp. nov.

(Figs 1, 2)

Material examined. HOLOTYPE: QM-S81181, ♂, 25 km N of Thornton on Gregory Downs-Camooweal

Road, Qld, 19°17'07.6"S, 138°58'55.1"E, 247 m, R. Raven, B. Baehr, A. Amey, 1 Jul–23 Sep 2006, pitfall. ALLOTYPE: QM-S75267, ♀, same data as holotype. OTHER MATERIAL: QM-S81203, ♂, Camooweal Caves National Park, Qld, 19°59'35.3"S, 138°09'01.5"E, 244 m, R. Raven, B. Baehr, A. Amey, 30 Jun–9 Sep 2006, pitfall; QM-S81199, ♂, 5 km W Riversleigh turnoff on Gregory Downs-Camooweal Road, Qld, 19°07'25.9"S, 138°57'10.6"E, 182 m, R. Raven, B. Baehr, A. Amey, 1 Jul–10 Sep 2006, pitfall.

Diagnosis. This species seems to be the eastern sister species of *W. alexandria*, sharing with it a small, hook-shaped median apophysis on the male palp and greatly elongated epigynal projections. Males have a much simpler embolar tip (Figs 1D–F, 2A–C); females have shorter projections at the tip of the spermathecae (Figs 1H, 2E).

Description. *Male.* Total length 2.26. Carapace 1.00 long, 0.96 wide, cl/cw 1.04, 0.36 high; sternum 0.52 long, 0.50 wide, sl/sw 1.04; abdomen 1.26 long, 0.76 wide; coxa I 0.68 long; relative length of coxae I–IV 1.00:1.00:0.88:1.18. Prosoma, legs orange, endites, labium distally pale; abdomen gray, dorsally with weak orange scutum, venter pale. AME large, elevated, PME largest, egg-shaped; eye group width 0.74 of caput width; AME 0.22; ALE 0.16; PME 0.24; PLE 0.16; AME-AME 0.04; AME-ALE 0.04; PME-PME 0.02; PME-PL 0.04; ALE-PL 0.04; eye group AME-PME 0.56; AME-AME 0.48; PME-PME 0.50. Clypeus 0.10 high. Abdomen covered with dark gray, recumbent scales; ALS 0.48 of abdominal length, more than their diameter apart. Male palp (Figs 1D–F, 2A–C): cymbium long, at least 2.2 times longer than wide, tip conical, retrolaterally straight, with two apical spines and dorso-apical scopula; conductor absent; median apophysis small, hook-shaped; terminal apophysis absent; embolus corkscrew-shaped, with blunt, indented tip, embolar base separated from tegulum, situated prolaterally; tibia about 1.8 to 2 times as long as wide, retrolateral tibial apophysis triangular.

Female. Total length 2.70. Carapace 1.20 long, 0.98 wide, cl/cw 1.22, 0.44 high; sternum 0.66 long, 0.56 wide, sl/sw 1.18; abdomen 1.50 long, 0.84 wide; coxa I 0.76 long; relative length of coxae I–IV 1.00:1.00:0.89:1.16. Coloration as in male. Eye as in male but eye group width 0.71 of caput width; ALE 0.18; PME 0.26; PLE 0.18; eye group AME-PME 0.5; PME-PME 0.54.

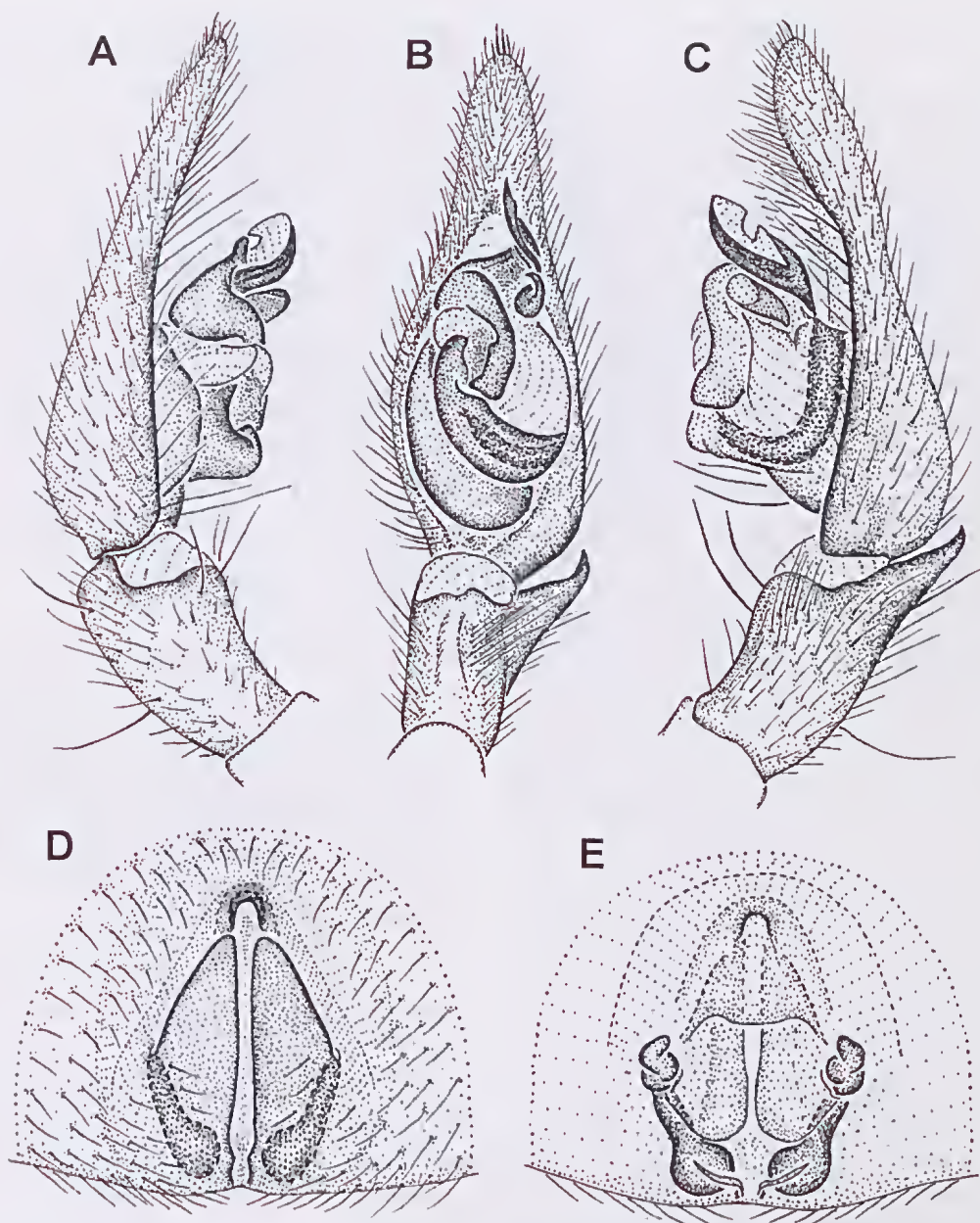


FIG. 2. *Wydundra leichhardti* sp. nov., male (A–C) and female (D–E). A, left palp, prolateral view; B, same, ventral view; C, same, retrolateral view; D, epigynum, ventral view; E, same, dorsal view.

Clypeus 0.08 high. Abdomen ALS 0.47 of abdominal length. Female palpal femur with 9–11 long, ventral setae. Epigynum (Figs 1G, H; 2D, E) with inverted, v-shaped anterior epigynal hood; anterior margin narrow, rounded; posterior margin with long, anteriorly blunt projections; epigynal ducts in v-shaped

position, originating on lateral sides of atrium; spermathecae about their diameter apart, globular, with short anterior projections.

Etymology. The specific name is a patronym in honor of Ludwig Leichhardt.

Distribution. Known only from north-western Queensland.

Wydundra alexandria sp. nov.

(Fig. 3A–E)

Material examined. HOLOTYPE: QM-S75271, ♂, N of Alexandria Station at Mittlebah Range, Northern Territory, 19°01'48.6"S, 136°39'14.0"E, 240 m, R. Raven, B. Baehr, A. Amey, 9 Jul–22 Sep 2006, pitfall. ALLOTYPE: QM-S75272, ♀, same data as holotype. OTHER MATERIAL: QM-S81197, 9 ♂♂, 2 ♀♀, same data as holotype; QM-S81193, 2 ♂♂, ♀, Stoney Creek, W Gregory River on Wills Road, NT, 18°35'51.9"S, 138°53'14.9"E, 98 m, R. Raven, B. Baehr, A. Amey, 2 Jul–11 Sep 2006, pitfall; QM-S81204, ♂, Tablelands Highway, S Calvert Road crossing at rise after flood plain, NT, 18°01'39.0"S, 135°36'26.4"E, 216 m, R. Raven, B. Baehr, A. Amey, 8 Jul–22 Sep 2006, pitfall; QM-S81194, ♀, Tablelands Highway, near One Mile Creek, NT, 17°30'25.8"S, 135°40'10.0"E, 283 m, R. Raven, B. Baehr, A. Amey, 8 Jul–22 Sep 2006, pitfall.

Diagnosis. This species seems to be the western sister species of *W. leichhardti*, sharing with it a small, hook-shaped median apophysis on the male palp and greatly elongated epigynal projections. Males have an elaborate, comb-shaped embolar tip (Fig. 3A–C); females have longer projections at the tip of the spermathecae (Fig. 3E).

Description. *Male.* Total length 2.06. Carapace 0.98 long, 0.88 wide, cl/cw 1.11, 0.3 high; sternum 0.64 long, 0.56 wide, sl/sw 0.14; abdomen 1.08 long, 0.66 wide; coxa I 0.60 long; relative length of coxae I–IV 1.00:1.00:0.87:1.20. Prosoma, legs orange; endites, labium distally pale; abdomen gray, venter pale, epigastric area orange. AME large, elevated, PME largest, egg-shaped; eye group width 0.73 of caput width; AME 0.20; ALE 0.14; PME 0.22; PLE 0.14; AME–AME 0.04; AME–ALE 0.04; PME–PME 0.02; PME–PLE 0.04; ALE–PLE 0.04; eye group AME–PME 0.42; AME–AME 0.44; PME–PME 0.46. Clypeus 0.08 high. Abdomen covered with gray recumbent scales; ALS 0.48 of abdominal length, about their diameter apart. Male palp (Fig. 3A–C): cymbium long, at least 2.2 times longer than wide, tip conical; retrolaterally straight, with dorso-apical scopula; conductor absent; median apophysis small, hook-shaped; terminal apophysis absent; sperm duct u-shaped; embolus corkscrew-shaped with blunt, indented tip, prolateral part comb-shaped; embolar base separated from tegulum, situated prolaterally; tibia about 1.8 to 2 times as long as wide, retrolateral tibial apophysis long, triangular, with bent tip.

Female. Total length 2.60. Carapace 1.04 long, 1.00 wide, cl/cw 1.04, 0.38 high; 0.6 wide, sl/sw 1.08; abdomen 1.56 long, 0.8 wide; coxa I 0.74 long; relative length of coxae I–IV 1.00:1.00:0.84:1.08. Colouration as in male. Eyes as in male but eye group width 0.67 of caput width; PME–PME 0.04; eye group AME–PME 0.48; PME–PME 0.48. Clypeus 0.1 high. Abdomen ALS 0.45 of abdominal length. Female palpal femur with 9–11 long, ventral setae. Epigynum (Fig. 3D, E) with inverted v-shaped anterior epigynal hood; anterior margin narrow, rounded; posterior margin with long, anteriorly pointed projections; spermathecae widely separated, more than their diameter apart, globular, with long projections at tip.

Etymology. The specific name is a noun in apposition taken from the type locality.

Distribution. Known only from eastern parts of the Northern Territory.

THE WYDUNDRA COOPER GROUP

This group contains those species described by Platnick & Baehr (2006) in which the epigynum has a median septum extending posteriorly from its anterior margin, and males have a deeply bifid retrolateral tibial apophysis: *Wydundra cooper* from New South Wales and South Australia, and *W. kalamurina* and *W. moolooloo* from South Australia.

THE WYDUNDRA NEINAUT GROUP

This group contains those species described by Platnick & Baehr (2006) in which both the external and internal elements of the epigynum have a single, medial, anteriorly directed projection: *Wydundra neinaut*, *W. octomile*, and *W. normanton* from Queensland, plus the new species *W. chillagoe* and *W. gilliat*.

Wydundra neinaut Platnick & Baehr, 2006

Wydundra neinaut Platnick & Baehr, 2006: 135, figs 312–316 [type locality, Moranbah, Queensland].

Material examined. QM-S81190, ♂, Karumba, W at junction of Burke Development Road to Chillagoe, Qld, 17°27'46.8"S, 141°10'58.6"E, 14 m, R. Raven, B. Baehr, A. Amey, 4 Jul–25 Sep 2006, pitfall; QM-S75337, S79022, ♂, 4 ♀♀, Lolworth National Park site 2, Qld, 19°49.7'S, 146°05.4'E, 270 m, QM party, 28 Sep–12 Dec 2006, pitfall, dry vine scrub; QM-S81170,

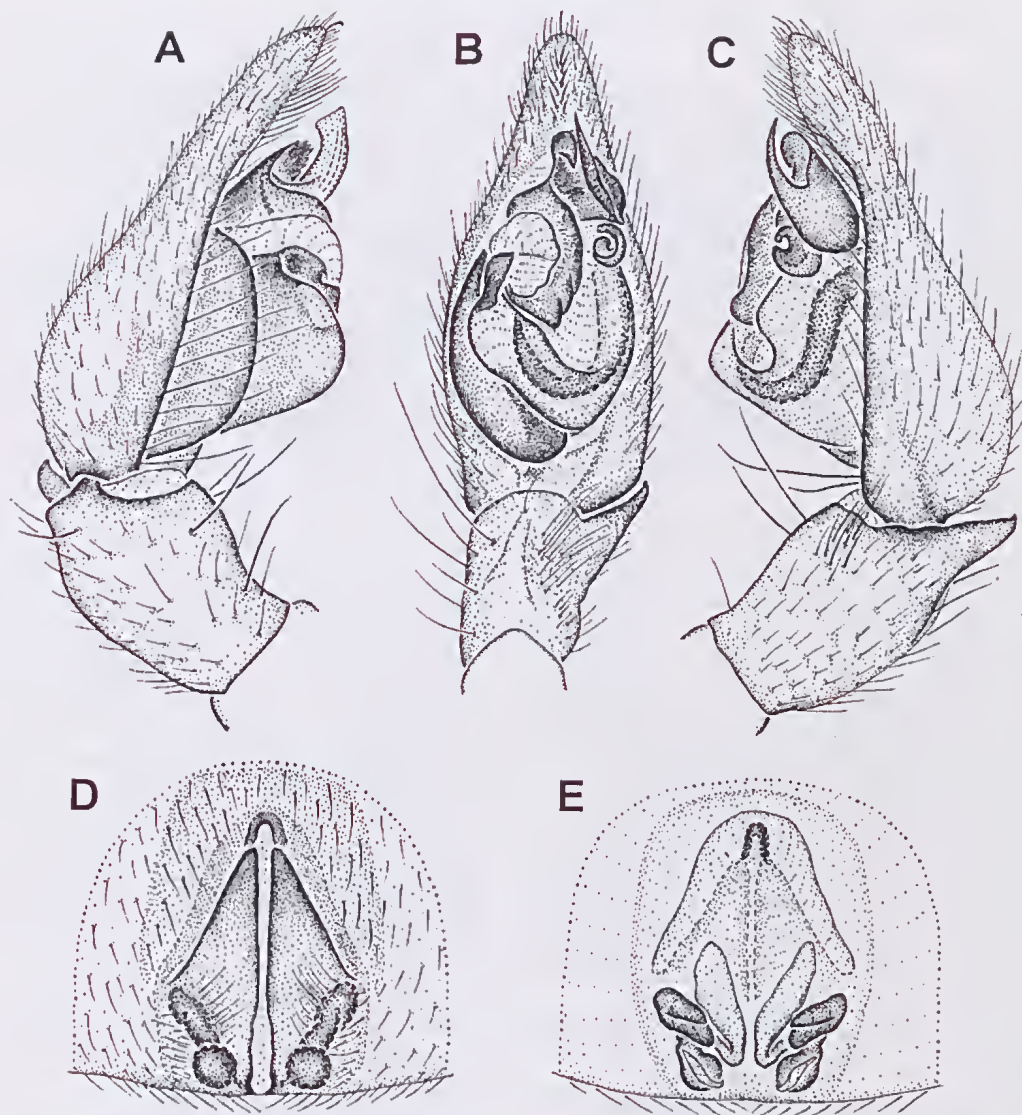


FIG. 3. *Wyndundra alexandria* sp. nov., male (A–C) and female (D–E). A, left palp, prolateral view; B, same, ventral view; C, same, retrolateral view; D, epigynum, ventral view; E, same, dorsal view.

♀, Mazeppa National Park site 4, Qld, 22°16'23.7"S, 147°15'50.6"E, 249 m, R. Raven, B. Baehr, A. Amey, 14 Jul–29 Sep 2006, pitfall; QM-S81344, ♂, 4.4 km SSW Red Falls, Qld, 19°57.7'S, 145°43.1'E, 360 m, QM party, 28 Sep–17 Dec 2006, pitfall, open forest; QM-S75358, ♂, Toomba Homestead site, Qld, 19°58'04.2"S, 145°34'49.1"E, 395 m, R. Raven, 17 Dec 2006–13 Feb 2007, pitfall, open forest on basalt ridge with *Brachychiton*.

Distribution. Previously known only from north- and mid-eastern Queensland; now also recorded from north-western Queensland.

Wyndundra octomile Platnick & Baehr, 2006

Wyndundra octomile Platnick & Baehr, 2006: 136, figs 317–321 [type locality, Eight Mile Creek, Qld].

Material examined. QM-S76995, S78034, S81320, 2 ♂♂, 3 ♀♀, Gregory Development Road, 1.5 km E Marble Creek, Qld, 19°06.2'S, 145°16.6'E, 456 m, QM party, 27 Sep–17 Dec 2006, pitfall, open forest; QM-S81346, ♀, Gregory Development Road, 1.5 km W Marble Creek, Qld, 19°06.2'S, 145°02.6'E, 456 m, QM party, 27 Sep–17 Dec 2006, pitfall, open forest.

Distribution. Northeastern Queensland.

Wyndundra chillagoe sp. nov.

(Fig. 4C, D)

Material examined. HOLOTYPE: QM-S81189, ♀, SW Chillagoe, along alternate Savannah Way, Qld, 17°29'29.8"S, 144°36'52.9"E, 460 m, R. Raven, B. Baehr, A. Amey, 13 Jul–27 Sep 2006, pitfall.

Diagnosis. Females can easily be distinguished from the other members of the *neinaut* group by the narrow anterior epigynal hood and the much larger anteriorly directed projection on the epigynum (Fig. 4C).

Description. *Male* unknown. *Female.* Total length 2.04. Carapace 0.80 long, 0.80 wide, cl/cw 1, 0.34 high; sternum 1.04 long, 0.96 wide, sl/sw 1.08; abdomen 1.24 long, 0.70 wide; coxa I 0.58 long; relative length of coxae I–IV 1.00:0.97:0.79:1.10. Prosoma, legs pale orange, endites, labium distally pale; abdomen pale gray, venter pale, booklungs orange. PME largest, egg-shaped; eye group width 0.75 of caput width; AME 0.15; ALE 0.14; PME 0.18; PLE 0.14; AME-AME 0.06; AME-ALE 0.04; PME-PME 0.02; PME-PLE 0.04; ALE-PLE 0.04; eye group AME-PME 0.38; AME-AME 0.36; PME-PME 0.38. Clypeus 0.06 high. Abdomen covered with gray slender recumbent scales; ALS 0.44 of abdominal length, more than their diameter apart. Female palp missing. Epigynum (Fig. 4C, D) with narrow anterior epigynal hood; anterior margin narrow, rounded; posterior margin with one inverted u-shaped projection; epigynal ducts n-shaped; spermathecae contiguous, oval, oriented transversely.

Etymology. The specific name is a noun in apposition taken from the type locality.

Distribution. Known only from the type locality in north-eastern Queensland.

Wyndundra gilliat sp. nov.

(Fig. 5)

Material examined. HOLOTYPE: QM-S75269, ♂, just W of Gilliat Creek, 25 km SE McKinlay, Qld, 21°24'17.6"S, 141°31'59.9"E, 202 m, R. Raven, B. Baehr, A. Amey, 29 Jun–8 Sep 2006, pitfall. ALLOTYPE: QM-S75270, ♀, same data as holotype. OTHER MATERIAL: QM-S81195, 2 ♂♂, 9 ♀♀, same data as holotype; QM-S81192, 2 ♂♂, ♀, 11 km W Barcardine, Qld, 23°32'47.9"S, 145°10'26.8"E, 267 m, R. Raven, B. Baehr, A. Amey, 28 Jun–7 Sep 2006, pitfall; QM-S81182, 19 km NW Winton by road, Qld, 22°16'10.9"S, 142°55'34.3"E, 212 m, R. Raven, B. Baehr, A. Amey, 29 Jun–7 Sep 2006, pitfall.

Diagnosis. Males resemble those of *Wyndundra normanton* in having a distally notched retrolateral tibial apophysis, but have a much larger median apophysis (Fig. 5A–C); females resemble those of *W. neinaut* but have a larger basal protrusion on the epigynum and unfused spermathecal ducts (Fig. 5D, E).

Description. *Male.* Total length 1.92. Carapace 0.82 long, 0.82 wide, cl/cw 1, 0.34 high; sternum 0.50 long, 0.48 wide, sl/sw 1.04; abdomen 1.10 long, 0.62 wide; coxa I 0.58 long; relative length of coxae I–IV 1.00:1.00:0.90:1.07. Prosoma, legs pale yellow; abdomen gray, dorsally with weak orange scutum and small, pale spot in front of spinnerets, venter pale gray; epigastric area orange. AME large, elevated, PME largest, egg-shaped; eye group width 0.75 of caput width; AME 0.14; ALE 0.14; PME 0.19; PLE 0.14; AME-AME 0.04; AME-ALE 0.04; PME-PME 0.02; PME-PLE 0.04; ALE-PLE 0.04; eye group AME-PME 0.34; AME-AME 0.32; PME-PME 0.4. Clypeus 0.08 high. Abdomen covered with dark slender recumbent scales; ALS 0.47 of abdominal length, about their diameter apart. Male palp (Fig. 5A–C): cymbium long, at least 2.2 times longer than wide, tip conical; conductor spatulate, originating distally; median apophysis large, ventrally excavated, with two distal tips; terminal apophysis absent; sperm duct weakly u-shaped; embolus long, flattened with blunt, indented tip; embolar base separated from tegulum with long basal embolar projection, situated prolaterally; tibia about 1.8 to 2 times as long as wide, dorsally excavated, retrolateral tibial apophysis long, triangular, with notched tip.

Female. Total length 2.00. Carapace 0.86 long, 0.86 wide, 0.38 high; sternum 0.52 long, 0.50 wide; abdomen 1.14 long, 0.72 wide; coxa I 0.56 long; relative length of coxae I–IV 1.00:1.00:0.89:1.14. Coloration as in male but without abdominal scutum. Eyes as in male but eye group width 0.67 of caput width; eye group AME-PME 0.4. Clypeus 0.06 high. ALS 0.53 of abdominal length. Palpal femur with 4–7 strong, ventral setae, tarsus with small claw. Epigynum (Fig. 5D, E): atrium large; anterior margin widely arched; posterior margin with two large, transverse, projecting epigynal ledges; epigynal ducts broadly fused anteriorly.

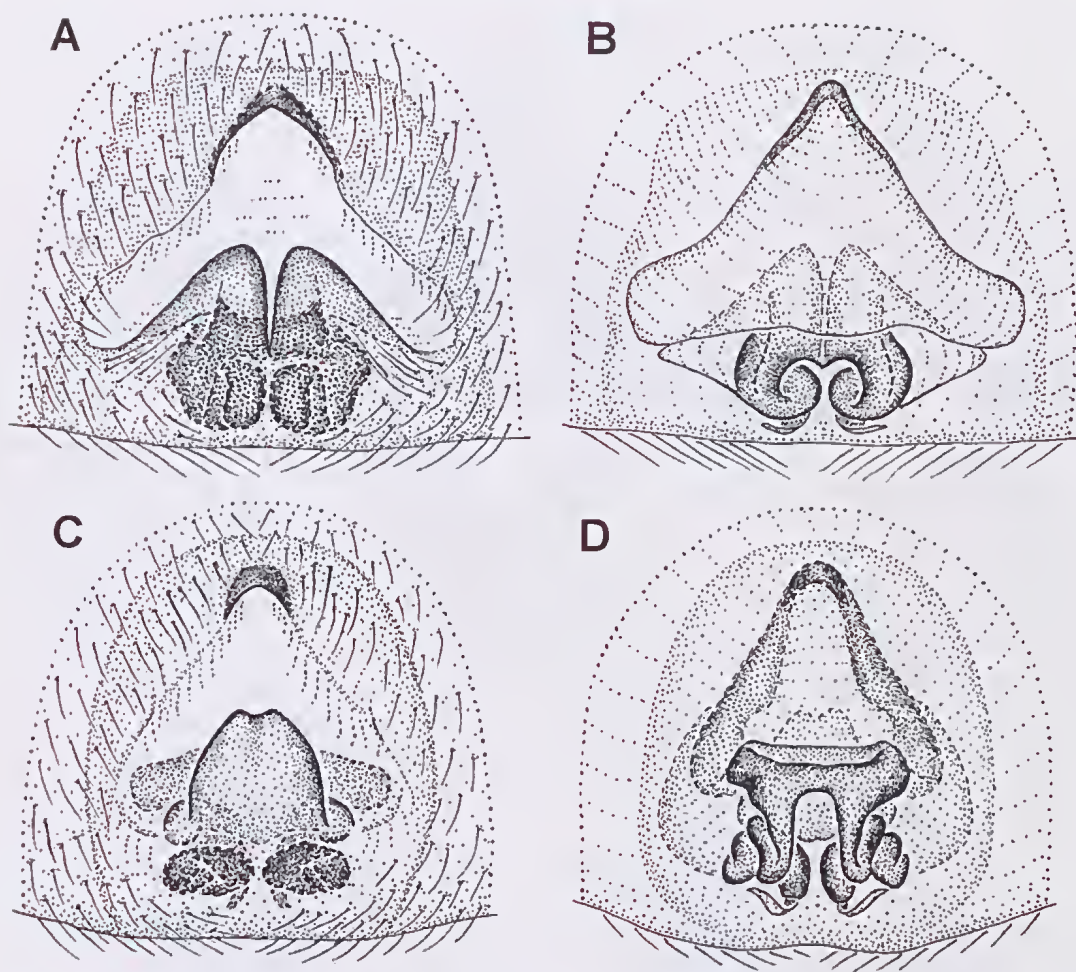


FIG. 4. *Wydundra camooweal* sp. nov. (A, B) and *W. chullagoe* sp. nov. (C, D), females. Epigynum: A, C, ventral view; B, D, dorsal view.

Etymology. The specific name is a noun in apposition taken from the type locality.

Distribution. Known only from central Qld.

THE WYDUNDRA WEBBERAE GROUP

This group contains those species described by Platnick & Baehr (2006) in which the epigynum has a rectangular atrium occupying the anterior two-thirds of the length, and the spermathecal ducts are elongated paramedially: *Wydundra webberae* from the Northern Territory, and *W. undara* and *W. garnet* from Queensland. A fourth species from Queensland, *W. kothi*, may also belong to this group, as the male palp resembles that of *W. garnet*, but the female genital atrium is

posteriorly much wider than in the other species, and the spermathecal ducts are differently arranged.

Wydundra undara Platnick & Baehr, 2006

Wydundra undara Platnick & Baehr, 2006: 140, figs 332–336 [type locality, Undara National Park, Qld].

Material examined. QM-S76982, S81336, 3 ♀♀, Gregory Development Road, 5.5 km SE Clarke River, Qld, 19°14.5'S, 145°28.4'E, 420 m, QM party, 27 Sep–17 Dec 2006, pitfall, open forest; QM-S76629, ♂, 3 km NNE Mt. Tregaskis, Qld, 19°15.5'S, 145°29.2'E, 411 m, G. Monteith, D. Cook, 17 Dec 2006–15 Feb 2007, dung pitfall, open forest.

Distribution. Known only north-eastern Qld.

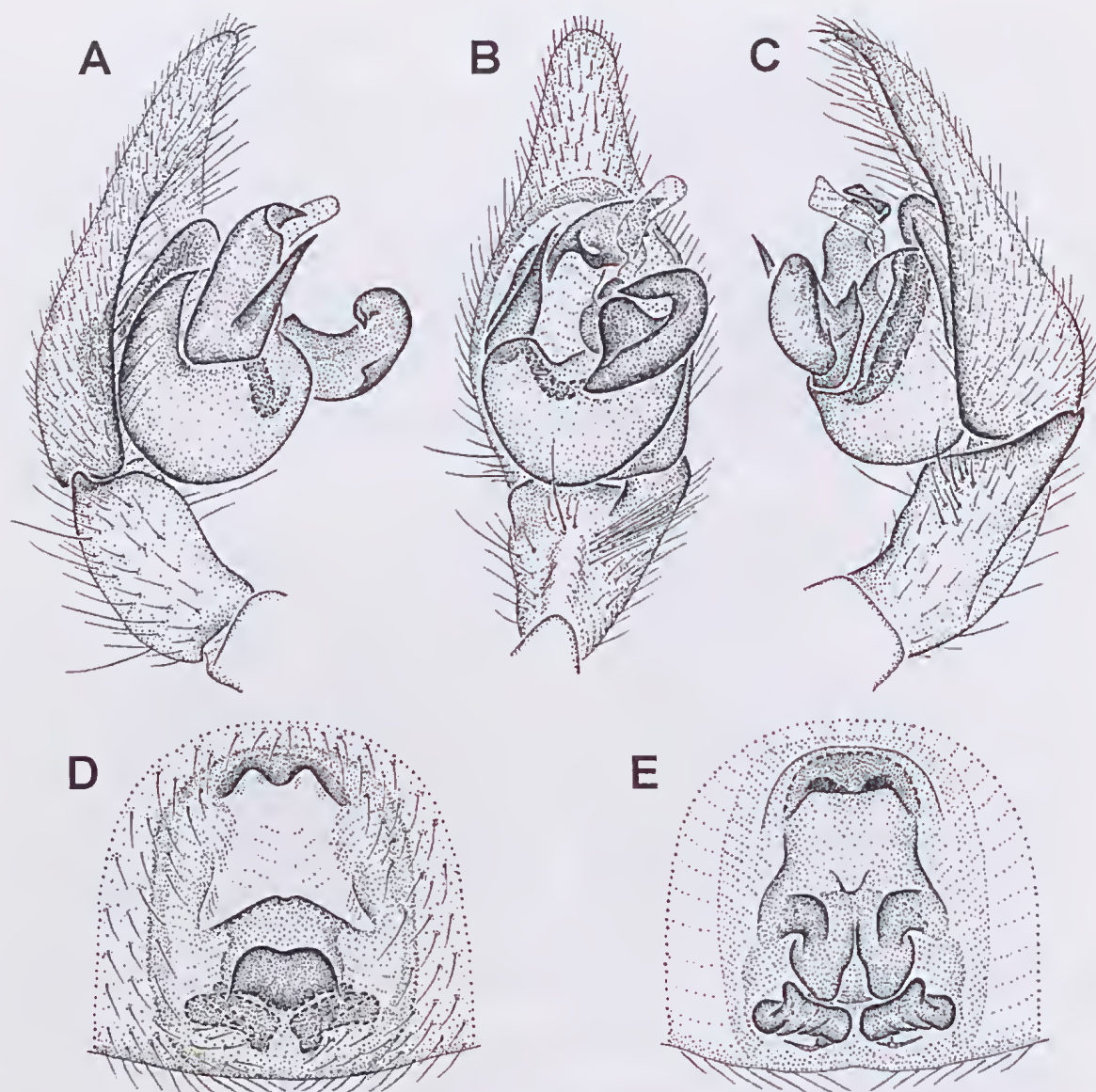


FIG. 5. *Wyndundra gilliat* sp. nov., male (A–C) and female (D, E). A, left palp, prolateral view; B, same, ventral view; C, same, retrolateral view; D, epigynum, ventral view; E, same, dorsal view.

Wyndundra kohi Platnick & Baehr, 2006

Wyndundra kohi Platnick & Baehr, 2006: 145, figs 342–346 [type locality, Davies Creek Nat. Park, Qld].

Material examined. QM-S81302, ♀, 13 km NW Burketown Development Road, Highbury, Qld, on ridge, 16°31'12.2"S, 143°23'17.1"E, 117 m, R. Raven, B. Baehr, A. Amey, 12 Jul–26 Sep 2006, pitfall.

Distribution. Known only from north-eastern Queensland.

THE WYDUNDRA FLATTERY GROUP

This group contains two species, *Wyndundra flattery* Platnick & Baehr from northern Queensland and *W. voc* Deeleman-Reinhold from Malaysia (Perhentian Island, off the east coast) and the Moluccas (Lonthoir Island), united by having a highly elongated retrolateral tibial apophysis and a separate dorsal tibial apophysis.

THE WYDUNDRA ETHABUKA GROUP

Wydundra ethabuka is known only from males taken in the Northern Territory and south-western Queensland; the palpal morphology is odd, with an extremely narrow terminal apophysis, but the narrow, elongated median apophysis suggests that the species may be closely related to *W. moondarra* from Queensland and *W. churchillae* from the Northern Territory. Those two species are apparently sister taxa, sharing a wide but short, anteriorly situated epigynal atrium, as well as very similar male palps.

THE WYDUNDRA GIBB GROUP

This group contains those species described by Platnick & Baehr (2006) in which the male embolus is elongate and is wide throughout its length: *Wydundra gibb* from Western Australia and the Northern Territory, *W. charnley* from Western Australia, and *W. dauntton* from Queensland. A fourth species known only from females from New South Wales, *W. morton*, apparently belongs to this group as well, as it shares with *W. dauntton* a unique pair of triangular, medially directed projections situated posterolaterally on the epigynum.

Wydundra dauntton Platnick & Baehr, 2006

Wydundra dauntton Platnick & Baehr, 2006: 151, figs 6, 13, 363–367 [type locality, Dauntton, Queensland].

Material examined. QM-S81206, ♂, Bang Bang jumpup, Qld, 18°31'24.8"S, 140°39'47.9"E, 38 m, R. Raven, B. Baehr, A. Amey, 10 Jul–23 Sep 2006, pitfall, rocky hillside; QM-S81186, ♂, ♀, near Bishop Creek, 23 km ESE Cloncurry, Qld, 20°47'04.8"S, 140°42'48.9"E, 210 m, R. Raven, B. Baehr, A. Amey, 29 Jun–9 Sep 2006, pitfall; QM-S81209, ♂, just NW Burke Development Road, at 1st jumpup, Qld, 19°02'54.7"S, 140°24'41.6"E, 61 m, R. Raven, B. Baehr, A. Amey, 2 Jul–11 Sep 2006, pitfall; QM-S81185, ♂, Leichardt Falls, E on Burketown–Normanton Road, at radio tower, Qld, 18°09'14.2"S, 140°05'47.4"E, 62 m, R. Raven, B. Baehr, A. Amey, 5 Jul–12 Sep 2006, pitfall; QM-S81205, ♂, Pack Saddle Creek, 30 km W Barcardine, Qld, 23°32'09.8"S, 144°59'14.0"E, 269 m, R. Raven, B. Baehr, A. Amey, 28 Jun–7 Sep 2006, pitfall; QM-S75348, ♀, just W Toomba eastern boundary, Qld, 19°57'43.8"S, 145°43'03.2"E, 360 m, R. Raven, A. Amey, 17 Dec 2006–13 Feb 2007, pitfall, open forest.

Distribution. Widespread from mid-western to mid-eastern Queensland.

THE WYDUNDRA LENNARD GROUP

Wydundra lennard, known only from the male holotype from the Kimberley region of Western Australia, has a bizarrely corkscrew-shaped embolus. It is possible that *W. clifton* from South Australia and *W. cunderlin* from Western Australia form a group with *W. lennard*; they are known only from females but have long, curved spermathecal ducts that may match the corkscrew-shaped embolus of their unknown males.

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The goblin spider genus *Opopaea* in Australia and the Pacific islands (Araneae: Oonopidae)

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ABSTRACT

The widespread and highly diverse goblin spider genus *Opopaea* Simon is a pantropical genus with biodiversity hotspots in Africa, Asia and Australia. We revise the Australian and Pacific species of the genus, provide redescrptions of the Australian species *O. banksi* (Hickman) and the Micronesian species *O. foveolata* Roewer, and new records of the pantropical *O. deserticola* Simon and *O. concolor* (Blackwall), as well as *O. apicalis* (Simon) which is newly transferred from *Epectris*, after the new synonymy of *Epectris* with *Opopaea*. The following species are provisionally transferred from *Epectris* to *Opopaea*, pending investigations into their generic affinities: *O. conujaingensis* (Xu), new combination from China; and *O. mollis* (Simon), new combination from Sri Lanka. Most Pacific Islands are inhabited by the four above-mentioned species but the following 15 newly described species are most likely native to the islands: from Fiji (*O. fiji*), Hawaii (*O. hawaii*), Palau (*O. palau*), New Caledonia (*O. amieu*, *O. bicolor*, *O. burwelli*, *O. calcaris*, *O. goloboffi*, *O. monteithi*, *O. ndoua*, *O. platnicki*, *O. raveni*, *O. striata*, *O. touho*, *O. tuberculata*). We treat the Australian *Opopaea* fauna and recognise 84 species including 71 new and 13 previously described species. The new Australian species include 21 species from New South Wales (*O. acuminata*, *O. addae*, *O. bushblitz*, *O. gerstmeieri*, *O. lebretoni*, *O. linea* (also occurs in Queensland), *O. magna*, *O. margaretehoffmannae*, *O. martini*, *O. michaeli*, *O. milledgei*, *O. nitens*, *O. otto*, *O. plana*, *O. simplex*, *O. sturt*, *O. suelewisae*, *O. sylvestrella*, *O. tenuis*, *O. ursulae*, *O. yorki*); six from Northern Territory (*O. ephemera*, *O. fishriver*, *O. gilliesi*, *O. johardingae*, *O. preecei*, *O. wongalara*); 13 from Queensland (*O. ameyi*, *O. brisbanensis*, *O. broadwater*, *O. carnarvon*, *O. carteri*, *O. chrisconwayi*, *O. douglasi*, *O. lambkinae*, *O. leichhardt*, *O. mcleani*, *O. proserpine*, *O. stanisici*, *O. ulrichi*); three from South Australia (*O. millbrook*, *O. mundy*, *O. stevensi*); and 28 from Western Australia (*O. aculeata*, *O. aurantiaca*, *O. billroth*, *O. callani*, *O. cowra*, *O. durranti*, *O. exoculata*, *O. flava*, *O. fragilis*, *O. framenau*, *O. gracilis*, *O. gracillima*, *O. harmsi*, *O. johanna*, *O. julianneae*, *O. marangaroo*, *O. millstream*, *O. nadineae*, *O. pallida*, *O. pannawonica*, *O. pilbara*, *O. rixi*, *O. robusta*, *O. rugosa*, *O. subtilis*, *O. triangularis*, *O. wheelarra*, *O. whim*). New records are provided for *O. sown* Baehr. Seven area-based keys to species are provided. □ *Opopaea*, Australia, Pacific islands.

The goblin spider genus *Opopaea* Simon was one of the first oonopid genera to be described (Simon 1891) and its limits and status changed continually for nearly a century. It was often confused or synonymised with *Gamasomorpha* Karsch until both genera were distinguished and diagnosed using the morphology of the male pedipalps and female genitalia by Brignoli (1974, 1975). The genus is widespread throughout tropical regions of the world, and it is apparent that some species, including the type species *O. deserticola* Simon, are readily distributed and have attained a pantropical distribution (Platnick & Dupérré 2009).

Species of *Opopaea* have the male palpal patella several times longer than the femur, connected to the femur medially, and the cymbium and bulb are completely fused (e.g. Andriamalala & Hormiga in press; Platnick & Dupérré 2009; Saaristo 2001; Saaristo & Marusik 2008). Other genera with swollen palpal patellae which arise subbasally on the femur, including *Camptoscaphiella* Caporiacco, *Malagiella* Ubick and Griswold, and *Prethopalpus* Baehr *et al.*, differ from *Opopaea* by the presence of legs spines in *Camptoscaphiella* and *Malagiella*, and the unfused cymbium and bulb in *Camptoscaphiella* and *Prethopalpus* (Baehr & Harvey 2013; Baehr *et al.* 2012; Baehr & Ubick 2010; Ubick & Griswold 2011).

Opopaea currently contains 83 named species (Andriamalala & Hormiga in press; Platnick 2013), including 42 from Africa and Madagascar, 12 from Australia, 19 from Asia, one from Europe, six from the Americas, and two pantropical species. Some of these species are clearly misplaced in *Opopaea* (Platnick & Dupérré 2009) and require restudy to establish a more accurate generic affiliation.

The *Opopaea* fauna of the Australian and Pacific region is poorly known, with only a handful of described species. The Australian fauna includes 12 named species, including *O. banksi* (Hickman) from an island off the South Australian coast which was originally described as a species of *Gamasomorpha* (Hickman 1950), the troglobitic *O. ectoguoplus* Harvey and Edward and *O. plinius* Harvey and Edward from subterranean

ecosystems in Western Australia (Harvey & Edward 2007), *O. concolor* (Blackwall) as a pantropic species, and eight species from rainforest habitats in Lamington National Park, Queensland (Baehr 2011). The Pacific fauna comprises *O. foveolata* Roewer from Micronesia (Roewer 1963), and the widely distributed *O. deserticola* and *O. concolor* (Blackwall) (Platnick & Dupérré 2009).

The purpose of this study was to continue a review of the Australian and Pacific Oonopidae by redescribing *O. banksi* and *O. foveolata*, and providing descriptions of 86 new species from the region. Many of these species are short-range endemics with very small distributions (Harvey 2002) and may prove to be important taxa for monitoring the effects of climate change (Baehr 2011). We also suggest that the genus *Epectris* is a synonym of *Opopaea* due to the close similarity of their respective type species to *Opopaea palau*.

MATERIAL AND METHODS

The specimens examined for this study are lodged in the following museums: Australian Museum, Sydney, Australia (AM); American Museum of Natural History, New York, USA (AMNH); Field Museum of Natural History, Chicago, USA (FMNH); Museum and Art Gallery of the Northern Territory, Darwin (MAGNT); Museum of Victoria, Melbourne, Australia (MVMA); Queensland Museum, Brisbane, Australia (QM); South Australian Museum, Adelaide, Australia (SAMA); and Western Australian Museum, Perth, Australia (WAM). A large collection of *Opopaea* from the Pacific region was kindly made available from J.W. Berry and J.A. Beatty collection, and is now deposited in the AMNH.

Specimens were examined using a Leica MZ16A microscope. Photomicrographic images were produced using a Leica DFC 500 and the software program AutoMontage Pro Version 5.2 (p). Specimens prepared for scanning electron microscopy were dehydrated in 100% ethanol; sputter coated, and imaged with a Hitachi TM_1000 table top SEM, or a Zeiss

Evo LS15 SEM incorporating a Robinson back-scatter detector.

Descriptions were generated with the aid of the Planetary Biodiversity Inventory (PBI) descriptive goblin spider database and shortened where possible. Drawings are done from left palp. Characters and measurements are explained in Figs 2 and 3. All measurements are in millimeters. Abbreviations are used in the text as follows: ALE, anterior lateral eyes; ALS, anterior lateral spinnerets; EF, epigastric fold; GA_p, globular appendix of female genitalia; GR, groove between tracheal spiracles; Na, nail-like process of female genitalia; PL, median plate; PLE, posterior lateral eyes; PLS, posterior lateral spinnerets; PME, posterior median eyes; PMS, posterior median spinnerets; PSc, paddle-like sclerite of female genitalia. Scale bars for habitus images are 1.0, and epigynes are 0.1. Full color, high-resolution versions of the images will be available on the goblin spider PBI website (<http://research.amnh.org/oonopidae>).

The species descriptions contain only the differences from the generic description. The description of the females includes just those differences from the male.

Because older locality labels often do not provide accurate geographical coordinates; latitudes and longitudes in parentheses, obtained from Google Earth, are included in the locality information.

SYSTEMATICS

Family *Oonopidae* Simon, 1890

Family *Oonopinae* Simon, 1890

Opopaea Simon, 1891

Opopaea Simon, 1891: 560 (type species by monotypy *Opopaea deserticola* Simon).

Epectris Simon, 1893: 74 (type species by monotypy *Epectris apicalis* Simon). NEW SYNONYMY.

Myrmecoscaphiella Mello-Leitão, 1926: 1 (type species by original designation *Myrmecoscaphiella borgmeyeri* Mello-Leitão). Synonymised by Platnick and Dupérré, 2009b: 3.

Nale Saaristo and Marusik, 2008: 39 (type species by original designation *Opopaea lena* Suman). Synonymised with *Epectris* by Platnick and Dupérré, 2009b: 29.

Diagnosis. The swollen male palpal patella of *Opopaea* which arises subbasally on the femur is also found in *Caumptoscaphiella*, *Malagiella* and *Prethopalpus*; they differ from *Opopaea* by the presence of legs spines in *Caumptoscaphiella* and *Malagiella*, and the unfused cymbium and bulb in *Caumptoscaphiella* and *Prethopalpus*. *Opopaea* females and males have a pair of small dorsolateral, triangular extensions on the pedicel as well as paired curved scutal ridges on the scuto-pedicel region. Females of *Opopaea* share with *Prethopalpus* the paddle-like sclerite (PSc) and the nail-like structure (Na), but lack the single, central receptaculum.

Description. *Male:* Total length 1.0–2.6. Carapace pale orange to yellow-brown, without any pattern; ovoid in dorsal view (Fig. 4A), pars cephalica flat or slightly elevated in lateral view (Fig. 4E), anteriorly narrowed to 0.49 times its maximum width or less, with rounded or angular posterolateral corners, posterolateral edge without pits, posterior margin not bulging below posterior rim, anterolateral corners without extension or projections, posterolateral surface without spikes, surface of elevated portion of pars cephalica and sides smooth, striated or strongly reticulate, thorax without depressions, fovea absent, without radiating rows of pits; rebordered (Fig. 4A, E), with or without denticles; plumose setae near posterior margin of pars thoracica absent; non-marginal pars cephalica setae light or dark, needle-like, present in U-shaped row; marginal setae light or dark, needle-like. Clypeus margin slightly rebordered, curved downwards in front view (Fig. 8D), sloping forward or vertical in lateral view (Fig. 8E), high, ALE separated from edge of carapace, by their radius or more, median projection absent; setae present, light or dark, needle-like. Eyes: six, well-developed, or reduced, subequal, or ALE or PME largest, ALE circular, PME squared or circular, PLE circular; posterior eye row mostly recurved, sometimes straight from both above and front. Sternum longer than wide (Fig. 7B) or as long as wide (Fig. 4B), yellowish white, pale orange or orange brown, uniform, fused to carapace, median concavity absent, without (Fig. 7B) or with radial furrows (Fig. 4B) between coxae I–II,

II-III, III-IV, surface smooth, finely reticulate, coarsely reticulate with or without pits, sickle-shaped structures absent, anterior margin unmodified, anterior corner unmodified, lateral margin with infra-coxal grooves and anterior and posterior openings (Fig. 7B), distance between coxae approximately equal (as Fig. 7B) or distance between coxae II and III larger (as Fig. 115B), without extensions of pre-coxal triangles, lateral margins unmodified, with or without posterior hump; posterior margin not extending posteriorly of coxae IV; setae sparse, light or dark, needle-like, evenly scattered, originating from small pits, without hair tufts. Mouthparts: chelicerae (Fig. 7D) straight, anterior face unmodified; without teeth on both promargin and retromargin; without tooth-like projections, fang directed medially, shape normal, without prominent basal process, tip unmodified; setae needle-like, densest medially; paturon distal region unmodified, posterior surface unmodified, promargin unmodified, inner margin unmodified, without or with laminate groove (Fig. 81F). Labium (Fig. 7B) triangular, fused to sternum, with 2 or 5 setae on anterior margin, anterior margin indented at middle, same as sternum in sclerotization. Endites distally not excavated, serrula present in single row (Fig. 82F), posteromedian part unmodified, anteromedian tip with one strong tooth-like projection (Fig. 7B), same as sternum in sclerotization. Abdomen cylindrical or ovoid (Fig. 7A), without long posterior extension, rounded posteriorly; dorsum soft portions white, without color pattern. Book lung covers, ovoid (Fig. 7C), without setae, anterolateral edge unmodified. Posterior spiracles connected by groove. Pedicel tube short, with dorsolateral triangular extensions (Fig. 7G), scuto-pedicel region with pair curved scutal ridges (Fig. 6E), between $\frac{1}{2}$ – $1\frac{1}{2}$ of diameter of pedicel (Figs 3A–C), plumose hairs absent or present, matted setae on anterior ventral abdomen in pedicel area absent, cuticular outgrowths near pedicel absent. Dorsal scutum strongly or weakly sclerotized, orange brown to pale orange, without color pattern, covering full length of abdomen, no soft tissue visible from above, not fused to epigastric scutum (Figs 3A–C), middle surface smooth, sides smooth, anterior half

without projecting denticles. Epigastric scutum strongly or weakly sclerotized, surrounding pedicel, not protruding; post-epigastric scutum strongly or weakly sclerotized, pale orange to orange brown, long, semicircular, covering nearly full length of abdomen, fused to epigastric scutum in males, with short or long posteriorly directed lateral apodemes (Fig. 5C). Spinneret scutum present with incomplete ring and fringe of stout setae. Interscutal membrane with setae. Colulus represented only by two setae. Spinnerets and legs as in Platnick and Dupérré (2009). Male genitalia: epigastric region with small, circular or oval sperm pore situated at level of anterior spiracles, without protruding extension, rebordered (Fig. 7C). Palp (Figs 7 H–J) normal size, right and left palps symmetrical; trochanter normal size, unmodified; femur normal size, two or more times as long as trochanter, without posteriorly rounded lateral dilation; patella one to two times as long as femur, without prolateral row of ridges, femur attaching to patella subbasally (Fig. 5 I) or medially (Fig. 7H); setae unmodified; cymbium fused with bulb not extending beyond distal tip of bulb (Fig. 5G); bulb 1 to 1.5 times as long as cymbium, slender, tapering apically, plumose setae absent or present. Embolus with distal excavation (Fig. 3F, arrow) and retrolateral depression 'fenestra' (Fig. 3E, arrow), not separated from bulb, without conductor.

Females. Total length 1.2–2.2. As in male except as noted. Endites without anteromedian tooth-like projection. Epigastric and postepigastric scutum not fused. Genitalia in ventral view: Between genital opening and grove, connecting posterior spiracles, is a wide triangular chitinized area, situated close to genital. Genitalia in dorsal view: t-shaped or paddle like sclerite (PSc) situated near genital opening with nail-like process (Na) fitting into posterior situated globular appendix (GAp) (Fig. 6G).

Remarks. Platnick and Dupérré (2009) noted the close similarity between *Opópaen* and *Epectris* with the latter differing from *Opopaea* by the dark spot at the posterior end of the abdomen, the long, basal protrusion on the palpal bulb, and the inverted V-shaped sclerotization in the female genitalic area. Now that we have

surveyed a large range of different Old World species attributable to *Opopaea*, we feel that *E. apicalis*, the type species of the genus, is simply a highly modified species of *Opopaea*, and newly synonymise the two genera, with *Opopaea* having precedence over *Epectris*. As noted by Platnick and Dupérré (2009), the three other species attributed to *Epectris* are unlikely to be congeneric with the type species of *Epectris* or *Opopaea*. Grismado *et al.* (in press) has transferred *E. aenobarbus* Brignoli, 1978 from Bhutan (Brignoli 1978) to *Trilacna* Tong and Li, 2007, leaving *E. conujaingensis* Xu, 1986 from China (Xu 1986), and *E. mollis* Simon, 1907 from Sri Lanka (Simon 1907) unaccounted for. With the synonymy of *Epectris* with *Opopaea*, we transfer these species to *Opopaea* until revisionary work on these species is undertaken:

- *Opopaea conujaingensis* (Xu, 1986), new combination (Xu 1986); and
- *Opopaea mollis* (Simon, 1907), new combination (Simon 1907).

Distribution. The genus *Opopaea* has a pan-tropical distribution. Some species have been recorded from single locations, although some Australian species are slightly more widespread. Many species can be regarded as short-range endemics as defined by Harvey (2002).

SPECIES FROM THE PACIFIC ISLANDS EXCLUDING NEW CALEDONIA

Key to species

1. Males 2
 - Females (unknown for *O. fiji*, *O. hawaii*, *O. palau*) 8
2. Bulb distal part with complex folds (Figs 4 F, 7 H–J) 3
 - Bulb distal part without complex folds (Figs 5 G–I, 8 H–J) 4
3. Bulb with huge semicircular folds wider than base of bulb (Figs 4 F–H) *O. fiji*
 - Bulb with huge flattened folds (Figs 7 H–J) *O. hawaii*
4. Bulb distal part strongly narrowed, with beak-

shaped terminal elements (Figs 8 H–J) ... 5

- Bulbal tip distal part not strongly narrowed (Figs 5 G–I) 6
- 5. Bulb with sharp basal protrusion. . *O. apicalis*
 - Bulb without sharp basal protrusion (Figs 8 H–J) *O. palau*
- 6. Bulb with prolateral seam at distal 1/3 part (Fig. 5G) *O. foveolata*
 - Bulb without prolateral seam at distal 1/3 part 7
- 7. Bulb ventrally expanded *O. deserticola*
 - Bulb not expanded ventrally ... *O. concolor*
- 8. Epigastric region with inverted v-shaped sclerotization 9
 - Epigastric region without inverted v-shaped sclerotization. 10
- 9. Inverted v-shaped sclerotization, situated between epigastric furrow and connection of posterior spiracles. *O. apicalis*
 - Inverted v-shaped sclerotization, situated close to epigastric furrow (Fig. 6F) *O. foveolata*
- 10. Epigastric region with knob posterior of epigastric furrow *O. concolor*
 - Epigastric region with knob close to epigastric furrow *O. deserticola*

Opopaea apicalis (Simon, 1893), new comb.

Epectris apicalis Simon, 1893: 301.

Opopaea lena Suman, 1965: 227, figs 9–14. Synonymised by Platnick and Dupérré, 2009b: 30.

Gamasomorpha ladigui Benoit, 1979: 198, fig. 4A–D. Synonymised with *O. lena* by Saaristo, 2001: 337.

Opopaea mortensenii Brignoli, 1980: 6, fig. 3. Synonymised with *O. lena* by Saaristo, 2001: 337.

Material examined. AUSTRALIA: *Christmas Island:* 1 ♂, 1 ♀, vicinity of Grants Well, ca. 10.46667°S, 105.65000°E, 13–28 Apr. 1989, leaf log litter, J.F. Lawrence (WAM T129286, PBI_OON 47410); 1 ♂, Hendersons Spring, CI-64, 10°29'13"S, 105°40'40"E, 7 April 1998, net over water outlet, W.F. Humphreys (WAM T84884, PBI_OON 18047); 1 ♂, Island Wide Survey 2005, Parks Australia North, way point 123, 10°28'42.4"S, 105°34'25.9"E, 13 June 2005, M. Thomas, H. Alpisal (WAM T87160, PBI_OON 5517); 1 ♂, Island Wide Survey 2005, Parks Australia North, way point 514, 10°27'06.9"S, 105°40'04.1"E, 12 Aug. 2005,

K. Retallick, M. Thomas (WAM T87161, PBI_OON 5518). COOK ISLANDS: Aitutaki: 1 ♂, near airstrip, 29 Mar. 1987, J. Berry (AMNH, PBI_OON 37807). Rarotonga: 2 ♀, Koromiri Island, 6 Apr. 1987, J. and E. Berry (AMNH, PBI_OON 37803); Koromiri Motu, 8 June 1987, J. Berry, 1 ♀ (AMNH, PBI_OON 37801); 5 ♀, Muri, 21.25556°S, 159.73303°W, 25 Mar. 1987, J. Berry (AMNH, PBI_OON 37800). MARSHALL ISLANDS: Kwajalein Atoll: 4 ♂, Ennyebegan Island, 25 July 1969, J. Berry (AMNH, PBI_OON 37804); 2 ♀, same data (AMNH, PBI_OON 37804); 6 ♀, Roi-Namur Islet, 9.39206°N, 167.46722°E, 27 July 1969, J. Berry (AMNH, PBI_OON 37796); 3 ♂, same data (AMNH, PBI_OON 37796); 1 ♂, Roi-Namur Islet, 9.39206°N, 167.46722°E, 22 July 1969, J. Berry (AMNH, PBI_OON 37806); 2 ♂, South Gugegu Island, 9.18446°N, 167.42558°E, 24 July 1969, J. Berry (AMNH, PBI_OON 37798); 2 ♀, same data (AMNH, PBI_OON 37798). Majuro Atoll: 1 ♀, Arniel Islet, 30 July 1969, J. Berry (AMNH, PBI_OON 37808); 2 ♀, Dalap Islet, 1 Aug. 1969, J. Berry (AMNH, PBI_OON 37794); 1 ♀, Dalap Islet, 26 July 1968, J. Berry (AMNH, PBI_OON 37805); 1 ♂, same data (AMNH, PBI_OON 37805); 1 ♀, same data (AMNH, PBI_OON 250); 1 ♂, Rotain Islet, 3 Aug. 1969, J. Berry (AMNH, PBI_OON 37799). PALAU: 2 ♀, Koror Island, 7.36055°N, 134.47916°E, 30 Mar. 1973, J. and E. Berry (AMNH, PBI_OON 37797); Peleliu: 1 ♀, Angaur Island, 27 Apr. 1973, J. and E. Berry (AMNH, PBI_OON 37793); 23 ♀, Angaur Island, 30 Apr. 1973, J. and E. Berry (AMNH, PBI_OON 37795); 1 ♀, Angaur Island, 30 Apr. 1973, J. and E. Berry (AMNH, PBI_OON 37802). USA: Hawaii: Hawaii Co.: 2 ♂, 4 ♀, Puna district, Route 137, 1 mi W Mackenzie State Park, 19.48300°N, 154.88384°W, 31 Jan. 1997, J. and E. Berry (AMNH, PBI_OON 37792); 2 ♀, Puna district, Route 137, Mackenzie State Park, 2 Feb. 1997, J. and E. Berry (AMNH, PBI_OON 37790); Kauai Co.: 2 ♀, National Tropical Botanical Garden, Lawai, near Poipu, 21.88230°N, 159.47558°W, 21 Jan. 1998, J. Berry (AMNH, PBI_OON 37791); 1 ♀, National Tropical Botanical Garden, near Poipu, 20 m, 21.88660°N, 159.46675°W, 20 Jan. 1998, J. and E. Berry (AMNH, PBI_OON 37789).

Description. *Male.* See Platnick and Dupérré (2009).

Female. See Platnick and Dupérré (2009).

Distribution. This pantropical species was fully redescribed by Platnick and Dupérré (2009). It is widely distributed in the both the New and Old Worlds, and we here provide new locality records from the Pacific Islands including Hawaii, as well as a new record from Christmas Island.

Opopaea concolor (Blackwall, 1859)

Oonops concolor Blackwall, 1859: 265.

Myrmecoscapliella borgmeyeri Mello-Leitão, 1926: 2. Synonymised by Platnick and Dupérré, 2009: 22.

Opopaea devia Gertsch, 1936: 5, fig. 13. Synonymised by Platnick and Dupérré, 2009: 22.

Opopaea guaraniana Birabén, 1954: 203, figs 30–36, 50. Synonymised by Platnick and Dupérré, 2009: 22.

Opopaea bandina Chickering, 1969: 147, figs 1–3. Synonymised by Platnick and Dupérré, 2009: 22.

Gamasomorpha atlantica Benoit, 1977: 35, figs 13a–e. Synonymised by Saaristo and Marusik, 2008: 20.

Material examined. AUSTRALIA: *Queensland*: 4 ♂, Bushy Island, 5 m, 20.98333°S, 150.03333°E, 18–20 Dec. 2008, A. Nakamura (QM S87352, S87354, S87360, S87365, PBI_OON 23490, 23500, 23503, 23515); 2 ♂, 4 ♀, Erskine Island, 5 m, 23.50000°S, 151.91666°E, 6–8 Oct. 2008, A. Nakamura (QM S87311, S87316, S87320, PBI_OON 23499, 23502, 23505); 1 ♂, 4 ♀, Lady Elliot Island, beach, 24.11200°S, 152.71000°E, 30 Mar.–6 May 2008, A. Nakamura (QM S87210, S87463, S87530, PBI_OON 23491, 23495, 23507); 1 ♀, Lady Musgrave Island, 5 m, 23.96666°S, 152.35000°E, 11–13 May 2008, A. Nakamura (QM S87395, PBI_OON 23518); 1 ♂, 2 ♀, Masthead Island, Casuarina, litter, 5 m, 23.56666°S, 151.66666°E, 7 Oct. 2008, A. Nakamura (QM S87252, S87451, S87462, PBI_OON 23506, 23510, 23520); 1 ♂, North Reef Island, 5 m, 23.16666°S, 151.96666°E, 29 Apr. 2009, A. Nakamura (QM S87410, PBI_OON 23516); 4 ♂, 2 ♀, North West Island, 5 m, 23.33333°S, 151.75000°E, 9–11 Oct. 2008, A. Nakamura (QM S87259, S87284, S87288, S87499, S87506, S87512, PBI_OON 23496–8, 23498, 23501, 23519, 23522); 1 ♀, One Tree Island, 5 m, 23.55000°S, 152.05000°E, 6 Aug.–23 Sept. 2008, A. Nakamura (QM S87443, PBI_OON 23517); 1 ♂, West Fairfax Island, beach, 5 m, 23.71666°S, 152.40000°E, 12 May–25 June 2008, A. Nakamura (QM S87473, PBI_OON 23504); 1 ♀, West Hoskyn Island, 5 m, 23.75000°S, 152.28333°E, 13–15 May 2010, A. Nakamura (QM S87301, PBI_OON 23523); 1 ♂, Wilson Island, 5 m, 23.33333°S, 151.93333°E, 1 May–24 June 2008, A. Nakamura (QM S87440, PBI_OON 23524). USA: *Hawaii*: Hawaii Co.: 1 ♂, Honokohau Harbor Beach, near Kailua, Scaevola–Messerchmidia litter, 18 Feb. 1995, J. Berry (AMNH, PBI_OON 27963); 2 ♀, same data except 16 Feb. 1995 (AMNH, PBI_OON 37824); 1 ♂, near Kailua–Kona, route 190 at mile marker 27.5, 17 Feb. 1995, J. and E. Berry (AMNH, PBI_OON 37821); 1 ♀, Parker Ranch, 5 mi S Waimea on Rt. 19, in grass, 17 Feb. 1995, J. Berry (AMNH, PBI_OON 27954); 1 ♂, Route 190, mile marker 29.5, roadside grass litter, 19.66599°N, 155.98110°W, 17 Feb. 1995, J. Berry (AMNH, PBI_OON 27973). Honolulu Co.: 1 ♀, Oahu, May 02, 1943, N.L.H. Krauss (AMNH, PBI_OON 209); 2 ♀, Oahu: Univ. of Hawaii Campus, 7 July 1957, A. Nadler (AMNH, PBI_OON 208). Kauai Co.: 1 ♀, Kauai county airport near Port Allen, rock in field along beach, 21 Jan. 1998, J. Berry (AMNH, PBI_OON 37499).

Description. *Male.* See Platnick and Dupérré (2009).

Female. See Platnick and Dupérré (2009).

Distribution. This pantropical species was fully redescribed by Platnick and Dupérré (2009). It is widely distributed in the both the New and Old Worlds, and we here provide new locality records from Hawaii and Queensland, Australia.

Opopaea deserticola Simon, 1891

Opopaea deserticola Simon, 1891: 560, plate 42, fig. 5.

Opopaea darlingtoni Bryant, 1940: 267, figs 5, 7. Synonymised by Dumitresco and Georgesco, 1983: 103.

Opopaea timida Chickering, 1951: 233, figs 20, 21. Synonymised by Platnick and Dupérré, 2009: 4.

Opopaea brasima Chickering, 1969: 148, fig. 4-10. Synonymised by Dumitresco and Georgesco, 1983: 103.

Material examined. **COOK ISLANDS:** *Aitutaki:* 1 ♀, Moturakau Island, 21.20000°S, 159.80000°W, 28 Mar. 1987, J. Berry (AMNH, PBI_OON 37826); 1 ♂, near airstrip, grass litter, 29 Mar. 1987, J. Berry (AMNH, PBI_OON 27977); 1 ♀, same data (AMNH, PBI_OON 27977); *Rarotonga:* 1 ♂, Arorangi village, tree shaking, 30 m, 14 Mar. 1987, J. and E. Berry, J. Beatty (AMNH, PBI_OON 27976). **FRENCH POLYNESIA:** *Marquesas Islands:* *Hiva Oa:* 1 ♀, Hanamenu, litter in scrub woodland, 50 m, 4 Feb. 1987, J. Berry (AMNH, PBI_OON 27799); 1 ♂, same data (AMNH, PBI_OON 27799); 1 ♂, Hanamenu, 9.76571°S, 139.14050°W, 5 Feb. 1987, J. Berry, E. Berry (AMNH, PBI_OON 38379); 4 ♂, Hanamenu, west ridge, among rock, 100 m, 5 Feb. 1987, J. Berry, E. Berry (AMNH, PBI_OON 37424); 1 ♀, same data (AMNH, PBI_OON 37424). *Nuku Hiva:* 1 ♂, near airport, desert habitat, in grass clump, 14 Feb. 1987, J. Berry (AMNH, PBI_OON 37425); 2 ♀, same data (AMNH, PBI_OON 37425); 1 ♀, Taiohae, 8.90978°S, 140.10176°W, 24 Jan. 1987, J. Berry (AMNH, PBI_OON 38459); *Tuamotu Archipelago:* *Rangiroa:* 1 ♀, Aratorua Motu, 18.38282°S, 140.71206°W, 7 June 1987, E. Berry (AMNH, PBI_OON 27971); 4 ♂, same data (AMNH, PBI_OON 27971). **MARSHALL ISLANDS:** *Enewetak Atoll:* 4 ♀, Bogan Islet (Irwin), 26 June 1969, J. Berry (AMNH, PBI_OON 38382); 1 ♂, Grinem (Kotu) Island, 21 June 1969 (AMNH, PBI_OON 37818); 2 ♂, Igurin Island, 18 June 1968 (AMNH, PBI_OON 37815); 1 ♀, Janet, Engebi Island, 15 June 1968, J. Berry (AMNH, PBI_OON 38446); 1 ♀, Japtan Island, 11.42400°N, 162.38400°E, 5 July 1968, J. Berry (AMNH, PBI_OON 38461); 1 ♂, Parry Island, litter, 11.46883°N, 162.18666°E, 10 June 1969, J. Berry (AMNH, PBI_OON 27975); 5 ♀, Parry Island, 11.46883°N, 162.18666°E, 13 June 1969, J. Berry (AMNH, PBI_OON 37814); 1 ♂, Rojoa Island (Ursula), 11.61666°N, 162.33333°E,

3 Aug. 1968, J. Beatty (AMNH, PBI_OON 37816); 1 ♂, Sand Island, 19 June 1968, J. Berry (AMNH, PBI_OON 38452); *Kwajalein Atoll:* 1 ♀, Kwajalein Islet, 9.16666°N, 167.41666°E, 20 July 1969, J. Berry (AMNH, PBI_OON 38453). **USA:** *Hawaii:* *Hawaii Co.:* 1 ♀, Honokohau Harbor Beach, near Kailua, litter, 16 Feb. 1995, J. Berry (AMNH, PBI_OON 37824); 1 ♂, Puna District, Isaac Hale Beach Park, Pandanus litter, 23 Feb. 1995, E. Berry (AMNH, PBI_OON 27964). *Kauai Co.:* 1 ♀, Lawai, 21 Apr. 1997, D. Jamieson (AMNH, PBI_OON 204); 1 ♀, Kure Island, Eragrostis, 28.70000°N, 178.56666°W, 1 Sept. 1961, G. Butler (AMNH, PBI_OON 1083); 1 ♀, outside Hilo on Rt. 20: Kaumana Cave Co. Park, 10 Jan. 1980, K. and R. Schmidt (AMNH, PBI_OON 205).

Description. *Male.* See Platnick and Dupérré (2009).

Female. See Platnick and Dupérré (2009).

Distribution. This pantropical species was fully redescribed by Platnick and Dupérré (2009). It is widely distributed in the both the New and Old Worlds, and we here provide new locality records from the Pacific islands.

Opopaea fiji Baehr, sp. nov.
(Figs 4A–I)

Material examined. Holotype ♂: **FIIJ:** *Viti Levu:* Nadarivatu, 17.56000°S, 177.96600°E, on *Eucalyptus* tree, 14 May 1987, J. Berry (AMNH, PBI_OON 27962).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males can easily be separated from all other *Opopaea* species of the Pacific Islands by the cymbium-bulb complex with huge semicircular folds at distal part (Figs 4 F–H).

Description. *Male* (PBI_OON 27962, Figs 4A–I). Total length 1.58. Prosoma, mouthparts and abdominal scutae orange brown, legs pale orange. Carapace broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, sides striated, striation reaching PLE; lateral margin straight, with blunt denticles. Eyes, ALE: 0.085; PME: 0.074; PLE: 0.062, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching throughout most of their

length, PLE-PME touching. Sternum as long as wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits. Abdomen ovoid, pointed posteriorly; book lung covers small, ovoid; scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges and additional wide dorsal scutal ridge. Palpal patella 0.286 long, 0.143 wide, connection to femur 0.35; bulb ventrally strongly bulging with 2 extremely large, medially bent folds building nearly a circle (Figs 4 F-I).

Female. Unknown.

Distribution. This species is known only from the type locality in Fiji.

***Opopaea foveolata* Roewer**
(Figs 5A-I, 6A-G)

Opopaea foveolata Roewer, 1963: 121, figs 6e-h.

Other material examined. **COOK ISLANDS:** *Aitutaki:* 1 ♀, Maina Island, 18.91420°S, 159.83201°W, 3 June 1987, J. Berry (AMNH, PBI_OON 38388); 2 ♀, Moturakau Island, 21.20000°S, 159.80000°W, 28 Mar. 1987, J. Berry (AMNH, PBI_OON 38450); 1 ♂, 1 ♀, Tautu, tree shaking, 26 Mar. 1987, J. Berry, J. Beatty (AMNH, PBI_OON 27966); *Rarotonga:* 1 ♀, Turangi Valley, tree shaking, 20 m, 1 Apr. 1987, J. and E. Berry (AMNH, PBI_OON 27955). **FIIJI:** *Kadavu:* 1 ♂, 1 ♀, North Tip, Galoa I, 5 m, 19.06667°S, 178.16670°E, 27 June 1987, G. Monteith (QM S16761, PBI_OON 6563); 1 ♀, Waterfall, 2.5 km E of Vunisea, 29–30 June 1987, G. Monteith (QM S16790, PBI_OON 6562); *Vauua Levu:* 1 ♂, 1 ♀, Savusavu/Labasa Divide, 20 m, 16.63333°S, 179.21670°E, 19 July 1987, G. Monteith, D. Cook (QM S16766, PBI_OON 7398); *Viti Levu:* 2 ♀, 5 mi W Nausori, Naduruloulou Research Station, shaken from dead banana leaves, 15 May 1980, J. Beatty (AMNH, PBI_OON 27968); 2 ♀, Nausori, shaken from banana leaves, 18 May 1987, J. and E. Berry (AMNH, PBI_OON 27958); 1 ♀, Nausori, Koronivia Research Station, 8 May 1987, E. Berry (AMNH, PBI_OON 38458); 1 ♂, W Lami, 9 km W Suva, 23 May 1987, J. and E. Berry (AMNH, PBI_OON 37828). **FRENCH POLYNESIA:** *Marquesas Islands:* *Fatu Hiva:* 1 ♂, 1 ♀, Hanavave, coconut forest, 10.43333°S, 138.65000°E, 13 Feb. 1987, J. and E. Berry (AMNH, PBI_OON 37423); *Hiva Oa:* 2 ♀, Atuona, 9.76879°S, 139.01125°W, 8 Feb. 1987, J. Berry (AMNH, PBI_OON 37822); 4 ♂, 2 ♀, same data except 11 Feb. 1987, J. Berry (AMNH, PBI_OON 38451); 1 ♂, same data except 10 Feb. 1987 (AMNH, PBI_OON 38454); 1 ♀, same data except 10 Feb. 1987 (AMNH, PBI_OON 38457); *Nuku Hiva:* 1 ♂, Hakaui Bay, 8.79560°S, 140.22878°W, 25 Jan. 1987, J. Berry (AMNH, PBI_OON 38386); *Society Islands:* *Moorea*

Is.: 1 ♂, Paopao Village, 17.50811°S, 149.82390°W, 16 Jan. 1987 (AMNH, PBI_OON 37827). *Tnamotn Archipelago:* *Rangiroa:* 2 ♂, Topihairi Atoll, Manihi, 14.47500°S, 146.31500°W, 3 June 1987, J. Berry (AMNH, PBI_OON 38445). **MALAYSIA:** *Penang:* 1 ♀, Georgetown, Gelugor, USM Campus, under lawn grass, 28 Dec. 1984, J. Beatty (AMNH, PBI_OON 27957). **MARSHALL ISLANDS:** *Enewetak Atoll:* 7 ♂, 3 ♀, Japtan Island, Scaevola-Messerschmidia litter, 11.42400°N, 162.38400°E, 19 July 1968, J. Berry (AMNH, PBI_OON 27960); 1 ♀, 20 July 1968, J. Berry (AMNH, PBI_OON 38383); *Kwajalein Atoll:* 2 ♀, Ennyebegan Island, in dead Scaevola leaves, 7 Aug. 1969, J. Berry (AMNH, PBI_OON 27969); 2 ♀, 25 July 1969, J. Berry (AMNH, PBI_OON 37823); 1 ♀, 21 July 1969 (AMNH, PBI_OON 38447); *Majuro Atoll:* 1 ♀, Renimyo Island, in grass clumps on beach, 6 Aug. 1969, J. Berry (AMNH, PBI_OON 27967). **MICRONESIA:** 3 ♂, Saipan Island, Mariana Islands Laulau Bay area, 15.18333°N, 145.73333°E, 30 Dec. 1944, H. Dybas (FMNH, INS0000 033 487, PBI_OON 9994); *Pohnpei:* 1 ♂, 3 ♀, Ponape, E Kolonia, palm forest, 5 June 1973, J. Berry, J. Beatty (AMNH, PBI_OON 27953); 1 ♀, Ponape, SW Sekere, 6.90000°N, 158.21000°E, 10 June 1973, J. Berry (AMNH, PBI_OON 38384); *Yap:* 1 ♂, 1 ♀, Fedor Village, 4 Mar. 1980, J. Berry (AMNH, PBI_OON 38456); 1 ♂, Gilman Point, 15 Apr. 1980, J. Berry (AMNH, PBI_OON 38455); 2 ♂, Map, Chool, 12 Apr. 1980, J. Beatty, J. Berry (AMNH, PBI_OON 37817); 1 ♀, Ulithi atoll, Falalop, coconut litter, 9.97000°N, 139.67000°E, 2 May 1980, J. Berry (AMNH, PBI_OON 27956); 1 ♂, Wanyan, 9.53333°N, 138.11666°E, 17 Apr. 1980, J. Berry, J. Beatty (AMNH, PBI_OON 37825); 1 ♂, same data (AMNH, PBI_OON 38387). **NEW CALEDONIA:** *Province Nord:* 1 ♀, Aoupinie, top camp, litter, 850 m, 21.00000°S, 165.00000°E, 23 Nov. 2001, G. Monteith (QM S79735, PBI_OON 22643); 1 ♀, Col d'Amieu, 21.55000°S, 165.83330°E, 14 Mar. 1986, J. Boudinot (MNHN, PBI_OON 225); 1 ♀, Col d'Amoss picnic area, 115 m, 20.31718°S, 164.42300°E, 29 Nov. 2003, G. Monteith (QM S79882, PBI_OON 22598); 1 ♂, Cap Ndoua, rainforest, 50 m, 22.38333°S, 166.91666°E, 28–29 Nov. 2004, C. Burwell, S. Wright (QM S79809, PBI_OON 22654); 2 ♂, 1 ♀, Port Boise (G. Kanu), bark, 22.35000°S, 166.96666°E, 27 Sept. 2004, G. Monteith (QM S79798, PBI_OON 22629); 1 ♂, Pouembout, Highway 7 km S., 21.16666°S, 164.86666°E, 2 Dec. 2003–1 Feb. 2004, G. Monteith (QM S79776, PBI_OON 22588); 1 ♂, Tiea Reserve, bark, 30 m, 21.11666°S, 164.95000°E, 4–5 Nov. 2001, C. Burwell, G. Monteith (QM S79794, PBI_OON 22620); *Province Sud:* 1 ♀, Mt Mbu base, rainforest, litter, 350 m, 22.08333°S, 166.36666°E, 4 Feb. 2004, G. Monteith (QM ex S79748, PBI_OON 23486); 1 ♀, St.: 303 Plateau de Dogny, pente S, 700 m, 21.62472°S, 165.86805°E, 9 Jan. 1987, A. and S. Tillier (MNHN, PBI_OON 221). **PALAU:** *Hatohobei:* 1 ♂, Helen Reef, coconut-Messerschmidia, 9 Apr. 1973, J. Berry (AMNH, PBI_OON 27800). *Kayangel:* 1 ♀, Kayangel Atoll, shaking tree, coconut-Barringtonia, 8.06666°N,

134.70000°E, 22 May 1973, J. Berry (AMNH, PBI_OON 27959); *Koror*: 3 ♀, Arakabesan, 7.55000°N, 134.75000°E, 23 Mar. 1973, J. Berry (AMNH, PBI_OON 38510); 1 ♂, E Malakal, 7.21000°N, 134.25000°E, 9 Feb. 1973, J. Berry (AMNH, PBI_OON 38385); 1 ♀, Koror Island, 7.36055°N, 134.47916°E, 20 Mar. 1973, J. Berry (AMNH, PBI_OON 38448); 1 ♀, Rock Island E Malakal, 30 m, 7.21000°N, 134.25000°E, 8 Mar. 1973, J. Berry (AMNH, PBI_OON 38449); *Ngaremlengui*: 1 ♀, Airai, Babelthuap, 7.44944°N, 134.51717°E, 11 Mar. 1973, J. and E. Berry (AMNH, PBI_OON 38460); 1 ♂, Arakabesan, tropical dry forest, tree shaking, 7.55000°N, 134.75000°E, 1 Mar. 1973, E. Berry (AMNH, PBI_OON 38380); 3 ♂, Garakayo I., Pelew Islands, 7.01000°N, 134.25000°E, 8 Aug. 1945, H. Dybas (FMNH, INS 0000 033 486, PBI_OON 9993); 9 ♂, 14 ♀, Pulo Anna Island, Caroline Islands, 4.68333°N, 131.98333°E, 7 Apr. 1973, E. Berry (AMNH, PBI_OON 27970); *Sonsorol*: 5 ♂, 5 ♀, Sonsorol Island, forest litter, 5.32444°N, 132.22111°E, 6 Apr. 1973, J. and E. Berry (AMNH, PBI_OON 27961).

Diagnosis. Males and females resemble those of *O. deserticola* and *O. concolor* in body shape but can be distinguished by the prolateral seam at distal 1/3 part of the cymbium-bulb complex (Fig. 5G) and epigastric fold (EF) with small median knob; in dorsal view a paddle-like sclerite (PSc) with straight arms; nail-like process (Na) conical; globular appendix (GAP) small and circular (Fig. 6G).

Description. *Male* (PBI_OON 22620, Figs 5A–I). Total length 1.11. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow. Carapace, broadly oval in dorsal view, sides striated. Clypeus curved downwards in front view, vertical in lateral view. Eyes, ALE: 0.082; PME: 0.071; PLE: 0.060, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen ovoid, rounded posteriorly; book lung covers small, ovoid; scuto-pedicel region lower than diameter of pedicel, with strong curved paired curved scutal ridges and with knob opposite triangular extension. Palpal patella 0.152 long, 0.097 wide connected to femur at 0.033; cymbium-bulb complex

strongly bulging ventrally, with a prolateral ridge at distal third.

Female (PBI_OON 07398, Figs 6A–G). Total length 1.30. Eyes, ALE: 0.066; PME: 0.060; PLE: 0.47. Epigastric area, ventral view, epigastric fold (EF) with small median knob; in dorsal view paddle-like sclerite (PSc) with straight arms; nail-like process (Na) conical; globular appendix (GAP) small circular.

Distribution. This species is widespread in the Pacific region and is known from many different islands.

Remarks. *Opopaea foveolata* was originally described from numerous specimens collected throughout Micronesia, including the types from Guam (Roewer 1963). Although we have not examined the types, the specimens used in this redescription sufficiently match the description and illustrations to be confident of their identity.

Opopaea hawaii Baehr, sp. nov.
(Figs 7A–J)

Type. Holotype ♂: **USA: Hawaii:** Kauai Co.: Kokee, 22.10944°N, 159.66388°W, 12 Sept. 1957, A. Nadler (AMNH, PBI_OON 00207).

Other material. **USA: Hawaii:** Kauai Co.: 1 ♂, Kokee, 22.10944°N, 159.66388°W, 11 Sept. 1957, A. Nadler (AMNH, PBI_OON 206); 1 ♂, same data except 12 Sept. 1957 (AMNH, PBI_OON 23488).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. fiji* in body shape and having a huge folded palpal tip but can be distinguished by the folds being not circular but flattened.

Description. *Male* (PBI_OON 00207, Figs 7A–J). Total length 2.20. Prosoma, mouthparts and abdominal scutae orange, palpal patella orange brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, sides striated; lateral margin straight, without denticles. Eyes big (Fig. 7D), ALE: 0.113; PME: 0.091; PLE: 0.094, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by

less than their radius, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide, radial furrows between coxae I-II, II-III, III-IV reduced to thin smooth lines (Fig. 7B). Abdomen, paired curved scutal ridges reduced to a pair of knobs (Fig. 7G), plumose hairs absent. Palpal patella 0.347 long, 0.183 wide, connection to femur 0.50; bulb ventrally slightly bulging with triangular wing-like structures on both sides of the tip (Figs 7 H-J).

Female. Unknown.

Distribution. This species is known only from Hawaii.

Opopaea palau Baehr, sp. nov.
(Figs 8A-J)

Material examined. Holotype ♂: PALAU: Sonsorol Island, forest litter, 5.32444°N, 132.22111°E, 6 Apr. 1973, J.E. Berry (AMNH, PBI_OON 27965).

Other material examined. PALAU: 1 ♂, Fanna Island, sand-plain, litter, 5.35000°N, 132.21666°E, 26 Aug. 2008, J.E. Czekanski-Moir (FMNH, INS 0000 056 905, PBI_OON 10848).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. apicalis* in body shape and shape of cymbium-bulb complex with narrow median part and beak-shaped terminal elements but can be distinguished by the pedicel having a fringe of setae and the lack of a sharp basal protrusion (Fig. 8G, H) at the cymbium-bulb complex.

Description. *Male* (PBI_OON 27965, Figs 8A-J). Total length 1.47. Prosoma, mouthparts and abdominal scutae pale orange, palpal patella orange brown, legs yellow. Carapace broadly oval, high-shouldered, top smooth, sides striated until surface of elevated portion of pars cephalica smooth, sides granulate; lateral margin rebordered, with blunt denticles. Eyes large, ALE: 0.081; PME: 0.073; PLE: 0.055, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE separated by less than

ALE radius, PME touching for less than half their length, PLE-PME touching. Sternum with radial furrows between coxae I-II, II-III, III-IV (Fig. 8B), furrow with rows of small pits. Abdomen ovoid; pedicel with fringe of long setae; scuto-pedicel region higher than diameter of pedicel, with connected paired curved scutal ridges that appeared as flattened W-shaped scutal ridge (Fig. 8G). Palpal patella 0.273 long, 0.122 wide, connection to femur 0.42, cymbium-bulb complex narrow, ventrally not bulging with extremely long strong incised tip, tip widened from dorsal view (Fig. 8 I).

Female. Unknown.

Distribution. This species is known only from Palau.

SPECIES FROM NEW CALEDONIA
Key to species

1. Males 2
— Females (unknown for *O. amieu* and *O. calcaris*) 15
2. Bulb with sharp basal protrusion. *O. apicalis*
— Bulb without sharp basal protrusion 3
3. Bulb with prolateral seam at distal 1/3 part (Fig. 5G) *O. foveolata*
— Bulb without prolateral seam at distal 1/3 part 4
4. Carapace sides striated (as in Figs 22E, 26E) 5
— Carapace sides smooth (as in Fig. 10E, 12E) 10
5. Carapace slightly elevated (Figs 17E, 25E) 6
— Carapace high shouldered (Fig. 21E), bulb with prolateral rounded spur (Fig. 21H, I) *O. platnicki*
6. Sternum with posterior tubercle (Fig. 29B) *O. tuberculata*
— Sternum tubercle absent (Fig. 17B) 7
7. Bulb narrow, ventrally slightly bulging (Figs 9H, 15H) 8
— Bulb compact, ventrally strongly bulging

- (Figs 18H, 26H) 9
8. Body pale, scutae weak, bulbal tip broad (Figs 9H, I) *O. amieu*
 – Body orange, scutae strong, bulbal tip narrow (Figs 15H, I) *O. goloboffi*
9. Prosoma dark, bulbal tip short (Fig. 17H, I) *O. monteithi*
 – Prosoma orange, bulbal tip long medially bent (Figs 25H, I) *O. striata*
10. Bulb with prolateral acute spur (Figs 14H, I) *O. calcaris*
 – Bulb without spur (Figs 19H, I) 11
11. Carapace slightly elevated, paired scutal ridges short (Fig. 19F) *O. ndoua*
 – Carapace high shouldered, paired scutal ridges long (as Fig. 23G) 12
12. Scuto-pedicel region with additional median ridge (as Fig. 23G) 13
 – Scuto-pedicel region without additional median ridge (Fig. 12G) 14
13. Eyes small, bulb narrow with small ‘fenestra’ (Fig. 10 I) *O. bicolor*
 – Eyes large, bulb broadly oval with wide ‘fenestra’ (Fig. 23D, I) *O. raveni*
14. Eyes large, bulb with s-shaped prolateral tip (Fig. 12 I) *O. burwelli*
 – Eyes small, bulb with narrow prolateral tip (Figs 27H, I) *O. toulio*
15. Carapace sides striated (as Figs 26B, D) .. 16
 – Carapace sides smooth (as Fig. 11B, D) . 20
16. Carapace slightly elevated (Fig. 30E) ... 17
 – Carapace high shouldered (Fig. 22B) *O. platnicki*
17. Epigynal area with posterior small triangular sclerite (Figs 30F, G) *O. tuberculata*
 – Epigynal area without triangular sclerite (as Figs 16F, G, 26F, G) 18
18. 1 Epigastric fold with small knob-shaped sclerite (Fig. 16F, G) *O. goloboffi*
 – Epigastric fold with wide triangular sclerite (Figs 18F, G, 26F, G) 19
19. Semicircular ridge posteriorly of epigastric fold (Figs 26F, G) *O. striata*
 – Semicircular ridge absent (Figs 18F, G) *O. monteithi*
20. Scuto-pedicel region with additional median ridge (Figs 11E, 20E) 21
 – Scuto-pedicel region without additional median ridge (Figs 13E, 28E) 23
21. Paired scutal ridges short interrupted (Fig. 20E) *O. ndoua*
 – Paired scutal ridges not interrupted semicircular (as Fig. 11E) 22
22. Eyes small, (Figs 11A, B, D) *O. bicolor*
 – Eyes large (Figs 24A, B, D) *O. raveni*
23. Eyes large (Figs 13A, B, D) *O. burwelli*
 – Eyes small (Figs 28A, B, D) *O. toulio*

Opopaea amieu Baehr, sp. nov.
(Figs 9A–J)

Material examined. Holotype ♂: NEW CALEDONIA: Province Nord: 2 km W of Col d’ Amieu Forestry Station, 21.55000°S, 165.83330°E, rainforest, litter, 430 m, 8 May 1984, G. Monteith, D. Cook (QM S79743, PBI_OON 22622).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males can be distinguished from all other *Opopaea* species from the Pacific Islands by the pale, weakly sclerotized scutae and the very broad palpal tip with deep retrolateral ‘fenestra’ (Fig. 9 I).

Description. *Male* (PBI_OON 22622, Figs 9A–J). Total length 1.32. Prosoma, mouthparts and abdominal scutae pale yellow, palpal patella pale orange, legs white. Carapace, surface of elevated portion of pars cephalica smooth, sides finely striated; lateral margin without denticles. Eyes, ALE 0.055; PME 0.054; PLE 0.052, ALE largest, ALE, PLE circular, PME squared; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE-PLE touching, PME touching, PLE-PME touching. Sternum longer than wide,

surface smooth, with radial furrows between coxae I-II, II-III, III-IV, bulging between coxae IV; setae abundant, light, evenly scattered, originating from small pits. Abdomen ovoid; book lung covers large; dorsal scutum covering full length of abdomen; epigastric scutum not protruding; post-epigastric scutum almost semicircular, with long posteriorly directed lateral apodemes, covering nearly full length of abdomen. Palpal patella 0.272 long, 0.136 wide, connection to femur 0.55; bulb slightly bulging, tip very broad, square with deep retrolateral 'fenestra' (Fig. 9 I).

Female. Unknown.

Distribution. *Opopaea amieu* is known only from rainforest litter of Col d' Amieu in New Caledonia.

Opopaea bicolor Baehr, sp. nov.
(Figs 10A–J, 11A–G)

Material examined. Holotype ♂: NEW CALEDONIA: Province Nord: Col d' Amieu Forestry Station, 21.55000°S, 165.83330°E, 440 m, 26 May 1987, R.J. Raven (QM S95135, PBI_OON 22621). Allotype ♀: collected with holotype (QM S11718, PBI_OON 23435).

Other material examined. NEW CALEDONIA: Province Nord: 1 ♀, Col d' Amieu, 4 km N, litter, 300 m, 21.55000°S, 165.83333°E, 8 May 1984, G. Monteith, D. Cook (QM S79812, PBI_OON 22652); 1 ♀, Gelima, 5 km S., rainforest, litter, 485 m, 21.58333°S, 165.98333°E, 15 Nov. 2002, G. Monteith (QM S79741, PBI_OON 22625); 1 ♂, 2 ♀, 2 km W Col d' Amieu Forestry Station, rainforest, 430 m, 21.55000°S, 165.83330°E, 26 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 23447); 1 ♂, 1 ♀, Col d' Amieu, rainforest, litter, 400 m, 21.75000°S, 165.85000°E, 31 July–7 Aug. 1978, S. and J. Peck (AMNH, PBI_OON 23445); Province Sud: 1 ♀, Mt Mou base, rainforest, litter, 350 m, 22.08333°S, 166.36666°E, 4 Feb. 2004, G. Monteith (QM S95143, PBI_OON 23485); 3 ♀, Col des Rousettes, dry forest, litter, 490 m, 21.45000°S, 165.46660°E, 29 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 23444).

Etymology. The specific name *bicolor* is a Latin adjective meaning with two colors.

Diagnosis. Males of this species resemble *O. burwelli* in body shape, having a cephalothorax with smooth sides, and a slim cymbium-bulb complex but can be distinguished by much smaller eyes and the straight prolateral bulbal tip (Figs 10D, H). In females, the epigastric fold

(EF) in dorsal view has a paddle-like sclerite (PSc) with straight arms (Fig. 11G).

Description. Male (PBI_OON 22621, Figs 10A–J). Total length 1.58. Prosoma and palpal patella orange brown, cymbium-bulb complex pale orange, legs yellow, femora and basal half of tibiae darkened, abdominal scutae pale orange. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, sides smooth, posteriorly with a pair of rounded humps and a horizontal row of 6 setae; lateral margin straight, with blunt denticles; clypeus margin slightly rebordered, straight in front view, vertical in lateral view. Eyes, ALE: 0.056; PME: 0.051; PLE: 0.043, ALE largest, all eyes circular; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide with radial furrows between coxae I-II, II-III, III-IV, furrow smooth; setae sparse, light, evenly scattered, originating from small pits. Abdomen ovoid; book lung covers large, ovoid; scuto-pedicel region more than diameter of pedicel, with paired curved scutal ridges, an additional dorsal, median scutal ridge and plumose setae on the sides of the pedicel. Palpal patella 0.320 long, 0.150 wide, connection to femur 0.50; cymbium-bulb complex slender, ventrally slightly bulging, distal part prolaterally straight, with triangular tip in retrolateral view (Fig. 10H).

Female (PBI_OON 23435, Figs 11A–G). Total length 1.79. Eyes, ALE: 0.058; PME: 0.039; PLE: 0.037. Epigastric area, dorsal view paddle-like sclerite (PSc) with straight arms (Fig. 11G).

Distribution. This species is known only from New Caledonia.

Opopaea burwelli Baehr, sp. nov. (Figs 12A–J, 13A–G)

Material examined. Holotype ♂: NEW CALEDONIA: Province Sud: Plateau de Dogny, rainforest, litter, 21.61666°S, 165.88333°E, 1085 m, 16 Nov. 2002, C. Burwell (QM S79863, PBI_OON 22591). Allotype ♀: collected with holotype (QM S79863, PBI_OON 23424).

Other material examined. NEW CALEDONIA: Province Sud: 1 ♀, Me Maoya camp, rainforest, litter, 1170 m, 21.36666°S, 165.33333°E, 12 Nov. 2002, G. Monteith (QM S79740, PBI_OON 22638); 1 ♀, Plateau de Dogny, rainforest, litter, 1085 m, 21.61666°S, 165.88333°E, 16 Nov. 2002, C. Burwell (QM S79863, PBI_OON 23425); Province Nord: 3 ♀, Ningua Res. camp, 21.00000°S, 165.00000°E, 12–13 Nov. 2001, G. Monteith (QM S60488, PBI_OON 7395); 4 ♂ (QM S60488, PBI_OON 7395).

Etymology. This species is named for Chris Burwell who collected the types as well as many other Oonopidae.

Diagnosis. Males and females resemble those of *O. touho* in having a high shouldered carapace and scuto-pedichel region without additional medial ridge, cephalothorax with smooth sides, and in males a slim cymbium-bulb complex, but can be distinguished by much larger eyes and in males bulb with s-shaped prolateral tip (Fig. 12 I). The epigastric area of females, in dorsal view, has a paddle-like sclerite (PSc) with arms bent at the end (Fig. 13G).

Description. *Male* (PBI_OON 22591, Figs 12A–J). Total length 1.85. Prosoma, mouthparts and abdominal scutae orange brown, palpal patella dark brown. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, top and sides smooth, with shoulders, lateral margin straight. Clypeus margin slightly rebordered, curved downwards in front view, sloping forward in lateral view. Eyes large, ALE: 0.109; PME: 0.093; PLE: 0.084, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scuto-pedichel region higher than diameter of pedicel, with paired curved scutal ridges, without additional ridge, plumose hairs on sides of pedicel; postepigastric scutum long, semicircular, with long posteriorly directed lateral apodemes. Palpal patella 0.327 long, 0.192 wide, connection to femur: 0.46. cymbium-bulb complex with seam (Fig. 12H), extremely slim, ventrally slightly bulging, prolaterally curved (Fig. 12 I).

Female (PBI_OON 23424, Figs 13A–G). Total length 2.16. Eyes extremely large, ALE: 0.108;

PME: 0.086; PLE: 0.076. Epigastric area, ventral view epigastric fold (EF) widely triangular, with small knob; in dorsal view a paddle-like sclerite (PSc) with arms bent at the end; nail-like process (Na) small; globular appendix (GAp) divided into a hood and drop-shaped extension (Fig. 13G).

Distribution. *Opopaea burwelli* is known only from New Caledonia.

Opopaea calcaris Baehr, sp. nov.
(Figs 14A–J)

Material examined. Holotype ♂: NEW CALEDONIA: Province Sud: Foret Nord, rainforest, litter, 22.32482°S, 166.91420°E, 480 m, 10 Dec. 2004–9 Jan. 2005 (Monteith, Grimbacher (QM S79778, PBI_OON 22617).

Other material examined. NEW CALEDONIA: Province Sud: 1 ♂, Cap Ndoua, rainforest, 22.38333°S, 166.91666°E, 50 m, 28 Nov. 2004–8 Jan. 2005, Monteith, Grimbacher (QM S79787, PBI_OON 22581); 1 ♂, Cap Ndoua, rainforest, litter, 22.38333°S, 166.91666°E, 50 m, 28–29 Nov. 2004, C. Burwell, S. Wright (QM S79810, PBI_OON 22660); 1 ♂, Cap Ndoua, rainforest, litter, 50 m, 22.38333°S, 166.91666°E, 28 Nov. 2004–8 Jan. 2005, G. Monteith (QM S79811, PBI_OON 23448); 1 ♂, Foret cachee, end of trail road Grande Terre, 22.19444°S 166.79055°E, 4 May 2007, J. Muriennne, P. Sharma (MCZ 510, PBI, PBI_OON 23676).

Etymology. The specific name is Latin, *calcar*, *calcaris* meaning spur, referring to the prolateral palpal spur of this species.

Diagnosis. The species resembles *O. platnicki* in having a prolateral extension at the basis of the cymbium-bulb complex but can be distinguished by the smooth sides of the carapace and the pointed spur (Fig. 14 I).

Description. *Male* (PBI_OON 22617, Figs 14A–J). Total length 1.50. Prosoma, mouthparts, abdominal scutae and palpal patella orange brown, legs yellow, without color pattern. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, with shoulders, surface top and sides smooth. Eyes, ALE: 0.091; PME: 0.076; PLE: 0.069, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with

radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits. Book lung covers large, ovoid, with longitudinal ridge; scuto-pedichel region higher than diameter of pedichel, with paired curved scutal ridges and additional wide dorsal scutal ridge (Fig. 14G), plumose hairs on sides of pedichel. Palpal patella 0.263 long, 0.159 wide, connection to femur at 0.46; cymbium-bulb complex slender, with visible seam, ventrally slightly bulging and strong, pointed prolateral spur at base, distal part with long slender medially bent tip (Fig. 14H, I).

Female. Unknown.

Distribution. This species is known only from southeastern New Caledonia.

Opopaea goloboffi Baehr, sp. nov.
(Figs 15A–J, 16A–G)

Material examined. Holotype ♂: NEW CALEDONIA: *Province Sud*: Plateau de Dogny, rainforest, litter, 21.61666°S, 165.88333°E, 1085 m, 16 Nov. 2002, C. Burwell (QM S79863, PBI_OON 23426). Allotype ♀: Plateau de Dogny, montane forest, 21.61666°S, 165.88333°E, 910 m, 25 May 1987, N. Platnick, R. Raven (AMNH (PBI_OON 212).

Other material examined. NEW CALEDONIA: *Province Sud*: 1 ♀, Pic du Pin, rainforest, litter, 22.24829°S, 166.82900°E, 23 Dec. 2004, G. Monteith (QM S79738, PBI_OON 22635); 1 ♂, Montagne des Sources, montane rainforest, litter, 900 m, 22.11666°S, 166.60000°E, 5 Sept. 1990, N. Platnick, R. Raven, P. Goloboff (AMNH, PBI_OON 213); 1 ♂, Ningua Res. camp, rainforest, litter, 1100 m, 21.75000°S, 166.15000°E, 27 Nov. 2001–29 Jan. 2002, G. Monteith (QM S60498, PBI_OON 7403); 1 ♂, Houpi Geant, 22.15°S 166.68333°E, 320 m, 6 May 2005, G. Monteith (QM S79777, PBI_OON 22594).

Etymology. This species is named for Pablo Goloboff, renowned arachnologist and creator of NONA and TNT, who collected specimens of this species.

Diagnosis. Males resemble those of *O. tuberculata* in scuto-pedichel region about diameter of pedichel with weak scutal ridges, sides of carapace striated and having long narrow palpal bulb but can be distinguished by the lack of a sternal crest between coxa IV (Fig. 15B). Females, the epigastric area in dorsal view has paddle-like sclerite (PSc) with evenly bent arms (Fig. 16G).

Description. *Male* (PBI_OON 23426, Figs 15A–J). Total length 1.27. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow. Carapace, pars cephalica slightly elevated in lateral view, sides striated; lateral margin straight, with blunt denticles. Eyes small, ALE: 0.055; PME: 0.055; PLE: 0.037, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I-II, II-III, III-IV, furrow smooth. Palpal patella: 0.225 long, 0.130 wide, connection to femur 0.50, bulb long and narrow, ventrally slightly bulging with broad distal tip slightly bent medially (Fig. 15 I).

Female (PBI_OON 22635, Figs 16A–G). Total length 1.50. Eyes, ALE: 0.060; PME: 0.055; PLE: 0.048. Epigastric area, in ventral view the epigastric fold (EF) has a small semicircular concavity, with a small knob (Fig. 16F); in dorsal view paddle-like sclerite (PSc) with evenly bent arms (Fig. 16G); nail-like process (Na) small; globular appendix (GAP) divided into hood and drop-shaped extension.

Distribution. This species is known only from New Caledonia.

Opopaea monteithi Baehr, sp. nov.
(Figs 17A–J, 18A–G)

Material examined. Holotype ♂: NEW CALEDONIA: *Province Nord*: Pombey 8 km SW Highway, 20.90000°S, 165.11666°E, 300 m, bark, 28 Nov. 2003, G. Monteith (QM S79737, PBI_OON 22640). Allotype ♀: collected with holotype (QM S79737, PBI_OON 23429).

Other material examined. NEW CALEDONIA: *Province Nord*: 1 ♀, 6 km NNE of Col d'Amieu, 21.55000°S, 165.85000°E, 300 m, bark, 11 Nov. 2001, C. Burwell (QM S79788, PBI_OON 22607); 1 ♀, Mandjelia, lower creek, 20.40000°S, 164.51666°E, 550 m, bark, 7–8 Nov. 2001, G. Monteith (QM S79814, PBI_OON 22648); 1 ♂, 2 km W of Col d'Amieu Forestry Station, rainforest, 21.55000°S, 165.83330°E, 430 m, litter, 26 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 23446); 1 ♂, same data except 1 Jan. 2002, G. Monteith (QM S79762, PBI_OON 22630); *Province Sud*: 1 ♂, Port Boise (G.

Kanua), 22.35000°S, 166.96666°E, 20 m, bark, 18 Nov. 2002, G. Monteith (QM S79817, PBI_OON 22647).

Etymology. This species is named for Geoff Monteith who collected the types as well as many other goblin spiders.

Diagnosis. Males resemble those of *O. striata* in body shape and having a strongly bulging bulb but can be distinguished by the the darker prosoma and the short, medially bent palpal tip (Fig. 17 I). In females, the epigastric area in dorsal view has a nearly straight paddle-like sclerite (PSc), which is only slightly bent at the end (Fig. 18G).

Description. *Male* (PBI_OON 22640, Figs 17A–J). Total length 1.49. Cephalothorax and palpal patella orange brown, sternum, mouthparts and abdominal scutae pale orange and legs yellow. Cephalothorax broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, sides striated; lateral margin undulate. Eyes large, ALE: 0.075, PME: 0.070, PLE: 0.054, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME touching. Sternum longer than wide, with smooth radial furrows between coxae I–II, II–III, III–IV. Abdomen, scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges and an additional median scutal ridge. Palpal patella, 0.270 long, 0.150 wide, connection to femur at 0.52; bulb ventrally strongly bulging with short medially bent tip.

Female (PBI_OON 23429, Figs 18A–G). Total length 1.68. Eyes, ALE: 0.081, PME: 0.060, PLE: 0.053. Epigastric area, ventral view, chitinized area (Ch) widely triangular, acute posteriorly, separated into two parts; in dorsal view paddle-like sclerite (PSc) nearly straight, slightly bent at the end; nail-like process (Na) small; globular appendix (Gap) triangular (Fig. 18G).

Distribution. This species is known only from New Caledonia.

Opopaea ndoua Baehr, sp. nov.
(Figs 19A–J, 20A–G)

Material examined. Holotype ♂: NEW CALEDONIA: *Province Sud*: Cap Ndoua, rainforest, litter, 22.38333°S, 166.93333°E, 150 m, 28 Nov. 2004–8 Jan. 2005, Monteith, Grimbacher (QM S95136, PBI_OON 22572). Allotype ♀: collected with holotype (QM S79761, PBI_OON 23449).

Other material examined. NEW CALEDONIA: *Province Sud*: 1 ♂, same data as holotype (QM S95137, PBI_OON 23450); 2 ♂, Cap Ndoua, rainforest, litter, 22.38333°S, 166.91666°E, 50 m, 28 Nov. 2004–8 Jan. 2005, G. Monteith (QM S79811, PBI_OON 22653).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males and females resemble those of *O. monteithi* in body shape, and in males having a strongly bulging ventral bulb and a short medially bent tip but can be distinguished by the smooth carapace. Females have a paddle-like sclerite (PSc) with strongly bent arms (Fig. 20G).

Description. *Male* (PBI_OON 22572, Figs 19A–J). Total length 1.52. Prosoma, mouthparts and abdominal scutae pale orange, palpal patella orange brown, legs yellow. Pars cephalica slightly elevated in lateral view, surface of elevated portion and sides smooth; lateral margin rebordered with blunt denticles. Eyes, ALE: 0.073, PME: 0.061, PLE: 0.057, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching throughout most of their length, PLE–PME separated by less than PME radius. Sternum with smooth radial furrows between coxae I–II, II–III, III–IV. Abdomen ovoid; book lung covers with longitudinal ridge. Abdomen, scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges and a short additional median scutal ridge. Palpal patella, 0.277 long, 0.145 wide, connection to femur 0.42; bulb ventrally strongly bulging with tiny medially bent tip (Figs 19H, I).

Female (PBI_OON 23449, Figs 20A–G). Total length 1.60. Eyes, ALE: 0.085; PME: 0.076; PLE: 0.067. Epigastric area, ventral view epigastric fold (EF) with small semicircular concavity and

small median knob; in dorsal view paddle-like sclerite (PSc) with strongly bent arms (Fig. 20G); nail-like process (Na) long triangular; globular appendix (Gap) a drop-shaped extension.

Distribution. This species is known only from Cap Ndoua in New Caledonia.

Opopaea platnicki Baehr, sp. nov.
(Figs 21A–J, 22A–G)

Material examined. Holotype ♂: NEW CALEDONIA: Province Sud: Col des Roussettes, dry forest, 21.45000°S, 165.46660°E, 490 m, 29 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 00215). Allotype ♀: collected with holotype (AMNH, PBI_OON 23443).

Other material examined. NEW CALEDONIA: Province Sud: 1 ♀, Me Maoya summit plateau, rainforest, litter, 21.36666°S, 165.33333°E, 1400 m, 12 Nov. 2002, G. Monteith, C. Burwell (QM S86416, PBI_OON 23484); 1 ♀, Col des Roussettes, rainforest, litter, 21.41666°S, 165.46666°E, 500 m, 31 July–7 Aug. 1978, S. and J. Peck (FMNH, FMHD78–256, PBI_OON 10308); 2 ♀, Col des Roussettes, bark, 21.41666°S, 165.46666°E, 500 m, 2 Feb. 2004, G. Monteith (QM S79780, PBI_OON 22580); 4 ♂, 1 ♀, Col des Roussettes, dry forest, litter, 490 m, 21.45000°S, 165.46660°E, 29 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 23443).

Etymology. This species is named for internationally renowned arachnologist Norman Platnick, who created the world spider catalog and collected the types as well as many other Oonopidae.

Diagnosis. Males resemble those of *O. calcaris* in body shape, being high shouldered and having a prolateral spur at base of cymbium-bulb complex but can be distinguished by the striated sides of the carapace and the rounded bulbal spur (Fig. 21 I). Females have a paddle-like sclerite (PSc) with with straight arms (Fig. 22G).

Description. *Male* (PBI_OON 00215, Figs 21A–J). Total length 1.47. Prosoma, mouthparts and abdominal scutae and palpal patellae orange brown, legs pale orange. Carapace broadly oval in dorsal view, high shouldered, only half of the sides striated; lateral margin straight, with blunt denticles. Eyes large, ALE: 0.092; PME: 0.073; PLE: 0.063, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most

of their length, PLE–PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges, and additional median ridge. Palpal patella 0.259 long, 0.151 wide, connection to femur 0.45; cymbium-bulb complex narrow, with rounded prolateral spur at base and short, medially bent tip (Figs 21 H–I).

Female (PBI_OON 23443, Figs 22A–G). Total length 1.68. Eyes, ALE: 0.081; PME: 0.069; PLE: 0.058. Epigastric area, ventral view, epigastric fold (EF) with small semicircular concavity and tiny knob; in dorsal view paddle-like sclerite (PSc) with straight arms; nail-like process (Na) small knob; globular appendix (Gap) small, knob-like.

Distribution. This species is known only from central New Caledonia.

Opopaea raveni Baehr, sp. nov.
(Figs 23A–J, 24A–G)

Material examined. Holotype ♂: NEW CALEDONIA: Province Sud: Mt Mou, base, rainforest, litter, 22.08333°S, 166.33333°E, 350 m, 18 Apr. 2005, G. Monteith (QM S79808, PBI_OON 22656). Allotype ♀: Col d' Amieu, W-slope, rainforest, litter, 21.61666°S, 165.81666°E, 470 m, 27 Jan. 2004, G. Monteith (QM S79747, PBI_OON 22602).

Other material examined. NEW CALEDONIA: Province Nord: 1 ♂, Col d' Amieu, 21.55000°S, 165.83330°E, 13 Mar. 1986, J. Boudinot (MNHN, PBI_OON 222); 3 ♂, 3 ♀, Col d' Amieu, 21.55000°S, 165.83330°E, 440 m, 26 May 1987, R.J. Raven (QM S11520, PBI_OON 22595); 4 ♂, Col d' Amieu, W-slope, rainforest, litter, 21.61666°S, 165.81666°E, 470 m, 27 Jan. 2004, G. Monteith (QM S79747, PBI_OON 22602); Koumac Caves, 20.53525°S, 164.33950°E, 19 m, 4 Aug. 1978, S. and J. Peck, 1 ♀ (AMNH AMNH, PBI_OON 23441). *Province Sud*: 1 ♀, Baie d'Upi, Ile de Pins, 22.59583°S, 167.52305°E, 20 Apr 2007, J. Murienne, P. Sharma (487, PBI_OON 23674); 1 ♀, same data (485, PBI_OON 23675); 1 ♀, Dzumac Road junction, 22.03333°S, 166.46666°E, 950 m, 5 Dec. 2003–26 Jan. 2004, G. Monteith (QM S79807, PBI_OON 22657); 1 ♀, Foret Nord, litter, 22.32482°S, 166.91420°E, 480 m, 1–2 Dec. 2004, Monteith, Grimbacher (QM S79779, PBI_OON 22587); 1 ♀, Mt Do, summit, rainforest, litter, 21.75000°S, 166.00000°E, 1000 m, 20 May 1984, G. Monteith (QM S79753, PBI_OON 22577); 1 ♂, 1 ♀, Mt Do, summit, 21.75000°S, 166.00000°E, 1000 m, 20 May 1987, R.J. Raven (QM S44594, PBI_OON

22590); 1 ♂, Mt Koghis, rainforest, litter, 22.16666°S, 166.51666°E, 700 m, 3 Nov. 2002, G. Monteith (QM S79745, PBI_OON 22611); Pic du Pin [GBM Site 1], litter, 22.24829°S, 166.82900°E, 26 Nov. 2004, Monteith, Grimbacher, 1 ♀ (QM S79815, PBI_OON 22649); 1 ♀, 2 km W col d'Amieu Forestry Station, rainforest, litter, 21.55000°S, 165.83330°E, 430 m, 8 May 1984, G. Monteith, D. Cook (QM S79743, PBI_OON 23432); 2 ♂, 3 ♀, 2 km W Col d'Amieu Forestry Station, rainforest, litter, 21.55000°S, 165.83330°E, 430 m, 26 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 217); 3 ♂, 1 ♀, same data (AMNH, PBI_OON 214); 1 ♂, 2 ♀, Col d'Ameiu, W slope upper, litter, 21.61666°S, 165.81666°E, 480 m, 3 May 2005, G. Monteith (QM S79784, PBI_OON 22574); 1 ♀, Col des Rousettes, dry forest, litter, 21.45000°S, 165.46660°E, 490 m, 29 May 1987, N. Platnick, R. Raven (AMNH, PBI_OON 23442); 6 ♂, 2 ♀, Mt Mou, base, rainforest, litter, 22.08333°S, 166.33333°E, 350 m, 4 Feb. 2004, G. Monteith (QM S79748, PBI_OON 22596); 1 ♂, 1 ♀, Mt. Koghis, 22.25000°S, 166.51666°E, 500 m, 26 July 1978, S. and J. Peck (FMNH, FM(DH)#78-252, PBI_OON 10305); 1 ♀, Ningua Res. camp, rainforest, litter, 21.75000°S, 166.15000°E, 1100 m, 27 Nov. 2001-29 Jan. 2002, G. Monteith (QM S60498, PBI_OON 23433); 1 ♀, Pic du Grand Kaori, rainforest, litter, 22.28333°S, 166.88333°E, 250 m, 22 Dec. 2004, G. Monteith (QM S79764, PBI_OON 22606); 1 ♀, Pic de Grand Kaori, litter, 22.28333°S, 166.88333°E, 250 m, 22 Nov. 2004-12 Jan. 2005, Monteith, Grimbacher (QM S79792, PBI_OON 22589); 2 ♂, 2 ♀, same data (QM 79791, PBI_OON 22614).

Etymology. This species is named for Robert Raven, a distinguished Australian arachnologist, who collected many Oonopidae.

Diagnosis. Males and females resemble those of *O. bicolor* in coloration and having smooth sides of the carapace but can be distinguished by much larger eyes. Males have a widened palpal tip (Fig. 23 I). In females the epigastric area in dorsal view has a paddle-like sclerite (PSc) with straight arms, ends slightly bent just reaching epigastric fold (Fig. 24G).

Description. *Male* (PBI_OON 22656, Figs 23A-J). Total length 1.49. Carapace and palpal patella orange brown, sternum, mouthparts and abdominal scutae pale orange, legs pale orange. Carapace broadly oval in dorsal view, high shouldered, top and sides smooth, lateral margin straight, with blunt denticles. Eyes large, ALE: 0.089; PME: 0.082; PLE: 0.073, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by

less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits. Abdomen, scuto-pedicle region about diameter of pedicle, with paired curved scutal ridges, and additional median scutal ridge. Palpal patella 0.287 long, 0.141 wide, connection to femur 0.59; cybium-bulb complex ventrally slightly bulging, with broad, triangular tip in dorsal view (Fig. 23 I).

Female (PBI_OON 22602, Figs 24A-G). Total length 1.68. Eyes, ALE: 0.081; PME: 0.066; PLE: 0.061. Epigastric area, ventral view, epigastric fold (EF) with small semicircular concavity and small knob; in dorsal view paddle-like sclerite (PSc) with straight arms, slightly bent at the end; nail-like process (Na) small knob; globular appendix (GAp) a long, drop-shaped extension.

Distribution. This species is known only from New Caledonia.

Opopaea striata Baehr, sp. nov.
(Figs 25A-J, 26A-G)

Material examined. Holotype ♂: NEW CALEDONIA: Province Sud: Col d'Ameiu, W slope upper, bark, 21.61666°S, 165.81666°E, 480 m, 25 Nov. 2003, G. Monteith (QM S95138, PBI_OON 22632). Allotype ♀: collected with holotype (QM S79774, PBI_OON 23427).

Other material examined. NEW CALEDONIA: Province Nord: 1 ♀, Aoupinié Top Camp, bark, 21.17888°S, 165.30277°E, 750 m, 2 May 2005, G. Monteith (QM S79790, PBI_OON 22585); 1 ♂, 4 ♀, Col d'Ameiu, bark, 21.55000°S, 165.83330°E, 440 m, 14 Nov. 2002, C. Burwell (QM S79785, PBI_OON 22619); 1 ♂, Col d'Ameiu, bark, 21.55000°S, 165.83330°E, 440 m, 27 Jan. 2004, G. Monteith (QM S79759, PBI_OON 22636); 1 ♀, Col d'Amoss, 3 km WSW, rainforest, litter, 20.30000°S, 164.40000°E, 520 m, 14 Dec. 2004, G. Monteith (QM S95139, PBI_OON 23487); 1 ♂, 1 ♀, Gelima, 7 km S, bark, 21.60000°S, 165.96666°E, 730 m, 15 Nov. 2002, G. Monteith (QM S79775, PBI_OON 22600); 1 ♂, 1 ♀, Ningua Reserve Camp, litter, 21.00000°S, 165.00000°E, 12-13 Nov. 2001, G. Monteith, C. Burwell (QM S79786, PBI_OON 22605); 1 ♂, Pic du Grand Kaori, rainforest, bark, 22.28333°S, 166.88333°E, 250 m, 22-24 Nov. 2004, G. Monteith, C. Burwell (QM S79793, PBI_OON 22592); *Province Sud*: 5 ♂, 3 ♀, Col d'Ameiu, W-slope, bark, 21.61666°S, 165.81666°E, 470 m, 14 Nov. 2002, C. Burwell, G. Monteith (QM 79783, PBI_OON 22603);

1 ♀, Mt Do, summit, rainforest, bark, 21.75000°S, 166.00000°E, 1000 m, 22 Nov. 2003, G. Monteith (QM S79789, PBI_OON 22576); 2 ♂, 2 ♀, Mt Mou base, rainforest, bark, 22.08333°S, 166.36666°E, 350 m, 4 Feb. 2004, G. Monteith (QM S79757, PBI_OON 22634).

Etymology. The specific name is a Latin adjective meaning striated and refers to the striated carapace sides of the species.

Diagnosis. Males resemble those of *O. ndoua* in body shape and having a strongly ventrally bulging bulb but can be distinguished by the striated carapace and the longer medially bent tip (Fig. 25 I). In females the epigastric area posteriorly has large semicircular concavity (Fig. 26G); paddle-like sclerite (PSc) with straight arms.

Description. *Male* (PBI_OON 22632, Figs 25A–J). Total length 1.60. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace, broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, top smooth, sides striated; lateral margin straight, with blunt denticles. Eyes, ALE: 0.077, PME: 0.074, PLE: 0.062, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges and additional median scutal ridge. Palpal patella, 0.293 long, 0.171 wide, connection to femur 0.44; bulb ventrally bulging, distal tip long, bent medially in 90° angle (Fig. 25 I).

Female (PBI_OON 23427, Figs 26A–G). Total length 1.68. Eyes, ALE: 0.093, PME: 0.071, PLE: 0.055. Epigastric area, ventral view, epigastric fold (EF) widely triangular with small knob, posteriorly with large semicircular concavity (Fig. 26F); in dorsal view paddle-like sclerite (PSc) with straight arms; nail-like process (Na) small knob; globular appendix (GAp) elliptical.

Distribution. This species is known only from New Caledonia.

Opopaea touho Baehr, sp. nov.
(Figs 27A–J, 28A–G)

Material examined. Holotype ♂: NEW CALEDONIA: Province Nord: Touho TV tower, rainforest, litter, 20.65000°S, 165.21666°E, 400 m, 30 Jan. 2004, G. Monteith (QM S95142, PBI_OON 22663). Allotype ♀: collected with holotype (QM S79742, PBI_OON 23428).

Other material examined. NEW CALEDONIA: Province Nord: 2 ♀, Mandjéla, 20.40000°S, 164.53330°E, 700 m, 13 May 1992, R. Raven, G. Ingram, E. Guilbert (QM S37726, PBI_OON 7172); 1 ♀, Mandjéla, rainforest, litter, 20.40000°S, 164.53330°E, 700 m, 12 May 1984, G. Monteith, D. Cook (QM S79750, PBI_OON 22584); 1 ♀, St.: 292 a Mt. Panie, pente E, 20.55861°S, 164.77444°E, 600 m, 3 Nov. 1988, A. and S. Tillier (MNHN, PBI_OON 226).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males and females resemble those of *O. burwelli* in having a high shouldered carapace and scuto-pedicel region without additional medial ridge, and cephalothorax with smooth sides, but can be distinguished by the much smaller eyes. Males similarly have a slim cymbium-bulb complex but can be separated by bulb with narrow prolateral tip (Fig. 27 I). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) with evenly bent arms.

Description. *Male* (PBI_OON 22663, Figs 27A–J). Total length 1.43. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace broadly oval in dorsal view, high shouldered, top and sides smooth; lateral margin straight, with blunt denticles. Eyes, ALE: 0.077; PME: 0.066; PLE: 0.056, ALE largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow smooth, posteriorly with two notched tips. Abdomen, scuto-pedicel region higher than diameter of pedicel, with paired strongly curved scutal ridges. Palpal patella 0.265 long, 0.144 wide, connection to femur 0.53; bulb narrow, ventrally

barely bulging (Fig. 27G) with short rounded, medially bent tip (Fig. 27 I).

Female (PBI_OON 23428, Figs 28A–G). Total length 1.65. Eyes, ALE: 0.087; PME: 0.070; PLE: 0.057. Epigastric area, ventral view, epigastric fold (EF) evenly bent with small knob; in dorsal view paddle-like sclerite (PSc) with evenly bent arms (Fig. 28G) ; nail-like process (Na) long conical; globular appendix (GAp) a small knob.

Distribution. This species is known only from the northern part of New Caledonia.

Opopaea tuberculata Baehr, sp. nov.
(Figs 29A–J, 30A–G)

Material examined. Holotype ♂, NEW CALEDONIA: Province Nord: Col d'Amieu, litter, 21.55000°S, 165.83330°E, 440 m, 18 Apr. 2005, G. Monteith (QM S79813, PBI_OON 22651). Allotype ♀: Province Sud: Mt Do, summit, rainforest, litter, 21.75000°S, 166.00000°E, 1000 m, 20 May 1984, G. Monteith (QM S95144 (QM, PBI_OON 23483).

Etymology. The specific name is a Latin adjective meaning with a tubercle, which refers to the swelling between coxae VI.

Diagnosis. Males and females were not collected together but the general body shape suggests they belong to the same species. Males resemble those of *O. striata* in having carapace sides striated and lacking high shoulders but can be distinguished by having a tubercle between coxae IV (Fig. 29B) and a narrow, barely bulging bulb (Fig. 29H). In females, the epigastric area in ventral view has epigastric fold (EF) widely triangular, with large semicircular concavity and triangular posterior extension (Fig. 30F, G).

Description. **Male** (PBI_OON 22651, Figs 29A–J). Total length 1.31. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow and palpal patella orange brown. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, sides striated; lateral margin straight, with blunt denticles. Eyes, ALE: 0.061; PME: 0.061; PLE: 0.042, ALE, PME subequal, larger than PLE, ALE circular, PME squared, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME

touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow smooth, with small tubercle between coxae IV (Fig. 29B). Abdomen, book lung covers large, ovoid, with longitudinal ridge; scuto-pedicle region about diameter of pedicel, with paired curved scutal ridges and additional median scutal ridge. Palpal patella 0.240 long, 0.130 wide, connection to femur at 0.50; bulb narrow, barely bulging ventrally with tiny medially bent tip (Figs 29 H–J).

Female (PBI_OON 23483, Figs 30A–G). Total length 1.66. Eyes, ALE: 0.063; PME: 0.052; PLE: 0.046. Epigastric area, ventral view, epigastric fold (EF) widely triangular, with large semicircular concavity and triangular posterior extension (Fig. 30F); in dorsal view paddle-like sclerite (PSc) with completely straight arms (Fig. 30G); nail-like process (Na) long, conical; globular appendix (GAp) with wide hood-shaped anterior part and a long, drop-shaped extension.

Distribution. This species is known only from central New Caledonia.

SPECIES FROM NEW SOUTH WALES

Key to species

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 - Scuto-pedicle region lower 3
3. Scuto-pedicle region about diameter of pedicel (as Fig. 39G) 4
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- Bulbal tip broad (Figs 68H, I) *O. yorki*
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Opopaea acuminata Baehr, sp. nov.
 (Figs 31A–J, 32A–G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Doubleduke State Forest, litter, 29.14150°S, 153.17150°E, 1 Feb. 1997, A. York (AM KS102836, PBI_OON 20477). Allotype ♀: Bungawalbin State Forest, litter, 29.05633°S, 153.10716°E, 1 Feb. 1997, A. York (AM KS102821, PBI_OON 20484).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, Banyabba State Forest, litter, 29.38000°S, 152.99777°E, 84m, 1 Feb. 1997, A. York (AM KS102723, PBI_OON 19369); 1 ♀, same data (AM KS102723, PBI_OON 19369); 1 ♂, 1 ♀, same data except 29.39050°S, 152.95900°E (AM KS102687, PBI_OON 19434); 1 ♀, same data (AM KS102666, PBI_OON 19460); 1 ♂, same data (AM KS102654, PBI_OON 19464); 1 ♂, same data (AM KS102662, PBI_OON 19470); 2 ♂, same data except 1 Jan. 1997, A. York (AM KS102828, PBI_OON 20465); 1 ♂, same data (AM KS102829, PBI_OON 20468); 2 ♂, same data (AM KS102815, PBI_OON 20471); 1 ♂, Beaury State Forest, Koorelah Ra., Tucker Box Road, 28.47233°S, 152.40183°E, 23 Mar.–9 May 1999, S. Lassau, C. Lemann (AM KS85277, PBI_OON 20200); 1 ♀, Bungawalbin State Forest, litter, 29.06055°S, 153.11194°E, 1 Feb. 1997, A. York (AM KS102725, PBI_OON 19355); 2 ♂, same data (AM KS102722, PBI_OON 19357); 2 ♂, same data (AM KS102721, PBI_OON 19362); 1 ♀, same data (AM KS102737, PBI_OON 19363); 1 ♀, same data (AM KS102735, PBI_OON 19365); 1 ♂, same data (AM KS102730, PBI_OON 19368); 2 ♂, same data (AM KS102822, PBI_OON 20485); 1 ♀, same data (AM KS102822, PBI_OON 20485); 3 ♂, same data except 29.03500°S, 153.15183°E (AM KS102698, PBI_OON 19387); 1 ♂, same data (AM KS102706, PBI_OON 19388); 1 ♂, same data (AM KS102700, PBI_OON 19390); 1 ♂, same data (AM KS102683, PBI_OON 19436); 1 ♂, same data (AM KS102682, PBI_OON 19447); 1 ♂, same data (AM KS102678, PBI_OON 19453); 1 ♂, same data (AM KS102673, PBI_OON 19457); 2 ♀, same data (AM KS102660, PBI_OON 19465); 1 ♂, same data

except 29.05633°S, 153.10716°E (AM KS102818, PBI_OON 20481); 1 ♂, same data (AM KS102825, PBI_OON 20487); 1 ♂, Devils Pulpit State Forest, forest, litter, 29.27066°S, 153.17166°E, 1 Feb. 1997, A. York (AM KS102680, PBI_OON 19454); 1 ♂, same data (AM KS102656, PBI_OON 19479); 1 ♂, Doubleduke State Forest, litter, 29.13833°S, 153.19000°E, 1 Feb. 1997, A. York (AM KS102720, PBI_OON 19372); 1 ♂, same data (AM KS102689, PBI_OON 19443); 2 ♀, same data (AM KS102688, PBI_OON 19449); 1 ♂, same data except 29.17266°S, 153.18566°E (AM KS102830, PBI_OON 20467); 2 ♂, Gibberagee State Forest, forest, litter, 29.32166°S, 153.10483°E, 1 Feb. 1997, A. York (AM KS102731, PBI_OON 19361); 1 ♂, same data (AM KS102690, PBI_OON 19451); 2 ♂, same data (AM KS102676, PBI_OON 19456); 1 ♂, 1 ♀, same data (AM KS102661, PBI_OON 19462); 1 ♂, same data (AM KS102671, PBI_OON 19475); 2 ♂, Mororo State Forest, litter, 29.31766°S, 153.23800°E, 1 Feb. 1997, A. York, 2 ♂ (AM KS102727, PBI_OON 19356); 1 ♂, Myrtle State Forest, litter, 29.19200°S, 153.01833°E, 1 Feb. 1998, A. York (AM KS102820, PBI_OON 20483); 1 ♂, Road to Coomba, 8.9 km SW of Menindee, 32.42433°S, 142.33866°E, 30 Nov.–19 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77538, PBI_OON 19578).

Etymology. The specific name is a Latin adjective, meaning sharp, pointed, referring to the palpal spur on the baso-median part of the cymbium.

Diagnosis. Males resemble those of *O. calcaris* from New Caledonia in having a palpal spur but can easily be separated from all other males of New South Wales by well developed palpal spur on baso-median part of cymbium (Fig. 31 I). Females have epigastric area in dorsal view a paddle-like sclerite (PSc) with straight arms, slightly bent at the end (Fig. 32G).

Description. *Male* (PBI_OON 20477, Figs 31A–J). Total length 1.40. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated. Eyes, ALE: 0.076; PME: 0.075; PLE: 0.067, ALE largest, ALE circular, PME squared; posterior eye row straight from above, procurved from front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scuto-pedicel

region about diameter of pedicel, with straight paired scutal ridges. Palpal patella, 0.291 long, 0.159 wide, connection to femur at 0.46; cymbium basally with nail-shaped prolateral apophysis, bulb ventrally slightly bulging, with long spoon-shaped medially bent tip.

Female (PBI_OON 20484, Figs: 32A–G). Total length 1.53. Eyes, ALE: 0.071; PME: 0.061; PLE: 0.054. Epigastric area, ventral view, epigastric fold (EF) with small semicircular concavity and small triangular knob; in dorsal view paddle-like sclerite (PSc) with straight arms, slightly bent at the end Fig. 32G); nail-like process (Na) elongated, conical; globular appendix (Gap) a long, drop-shaped extension.

Distribution. This species is known only from New South Wales.

Opopaea addsaе Baehr & Smith, sp. nov.
(Figs 33A–J, 34A–G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Budawang National Park, Western Distributor Road, 35.52400°S, 150.02583°E, 16 Mar. 1999, J. Tarnawski, S. Lassau (AM KS68573, PBI_OON 07704). Allotype ♀: collected with holotype (AM KS117918, PBI_OON 23553).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, 300 m S of jct North Head and Carls Mtn Roads, Murramarang National Park, 35.68483°S, 150.25716°E, 17 Mar. 1999, L. Wilkie, R. Harris (AM KS66905, PBI_OON 7564); 1 ♀, 32 km NW of Batemans Bay on Highway 54, 35.55166°S, 149.98900°E, 16 Mar. 1999, J. Tarnawski, S. Lassau (AM KS68575, PBI_OON 7710); 1 ♀, 32 km NW of Batemans Bay on Highway 54, 35.55166°S, 149.99033°E, 16 Mar. 1999, J. Tarnawski, S. Lassau (AM KS64767, PBI_OON 19613); 1 ♂, Beecroft Reserve, 33.75000°S, 151.06666°E, 10 May 2002, J. Noble (AM KS79740, PBI_OON 20206); 1 ♂, same data except 3 June 2001, J. Noble (AM KS72871, PBI_OON 20370); 1 ♂, Buckenbowra State Forest, No Name Fire Trail, 35.63666°S, 149.98966°E, 15 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64759, PBI_OON 19614); 1 ♀, Budawang National Park, Western Distributor Road, 35.52400°S, 150.02583°E, 16 Mar. 1999, J. Tarnawski, S. Lassau (AM KS64764, PBI_OON 19619); 1 ♂, 1 ♀, same data (AM KS119747, PBI_OON 23552); 1 ♀, Bungawalbin State Forest, 29.03500°S, 153.15183°E, Feb. 1998 A. York (AM KS74366, PBI_OON 7501); 1 ♂, Cabbage Tree Fire Trail, Buckenbowra State Forest, 35.62516°S, 150.01866°E, 15 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64757, PBI_OON 19609); 1 ♂, Coomerang Road, Dampier State Forest, 36.05950°S,

149.78416°E, 11 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64756, PBI_OON 19618); 2 ♂, Corn Trail Road, Buckenbowra State Forest, 35.55716°S, 150.00533°E, 16 Mar. 1999, J. Tarnawski, S. Lassau (AM KS68212, PBI_OON 7616); 1 ♀, same data (AM KS64763, PBI_OON 19611); 2 ♀, Irishman State Forest, Belbucca Road, 1.5 km from Middle Ridge Road junction, 30.54300°S, 152.66900°E, 24 Nov. 1999, M. Gray, G. Milledge, H. Smith (AM KS61538, PBI_OON 20579); 1 ♀, Jct of Carls Mt and North Head Roads, Murramarang National Park, 35.68483°S, 150.25716°E, 17 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64766, PBI_OON 19610); 1 ♂, Kuring-gai Chase National Park, nr Challenger Track, West Head, 33.58833°S, 151.27166°E, 24 Nov. 1992 (AM KS51305, PBI_OON 20538); 1 ♂, Macquarie Road, Buckenbowra State Forest, 35.63483°S, 149.88600°E, 16 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64755, PBI_OON 19617); 1 ♂, Mt Belmore State Forest, forest, litter, 29.10916°S, 152.75866°E, 1 Feb. 1997, A. York (AM KS102677, PBI_OON 19448); 1 ♂, Muogamarra Nat Res, Pacific HWY, 0.7 km SE Bird Gully Swamp, 33.55700°S, 151.18583°E, 16 Dec. 1999, M. Gray, G. Milledge, H. Smith (AM KS63322, PBI_OON 20554); 1 ♂, 1 ♀, Murramarang National Park, 1.6 km along Richmond Beach Road, 35.67516°S, 150.28366°E, 17 Mar. 1999, L. Wilkie, R. Harris (AM KS66922, PBI_OON 7560); 1 ♂, Murramarang National Park, along Richmond Beach Road from jct, 35.67583°S, 150.27583°E, 1400 m, 17 Mar. 1999, L. Wilkie, R. Harris (AM KS67225, PBI_OON 7531); 2 ♀, Murramarang National Park, 250 m along Road to Richmond and Oaky beaches, 34.69200°S, 150.27283°E, 17 Mar. 1999, L. Wilkie, R. Harris (AM KS67220, PBI_OON 7530); 2 ♂, 1 ♀, Murramarang National Park, North Head Road, 35.67516°S, 150.25883°E, 17 Mar. 1999, R. Harris, H. Smith (AM KS68574, PBI_OON 7712); 2 ♀, N side of Durras Road, 1.9 km W of Durras, 35.65350°S, 150.27033°E, 17 Mar. 1999, J. Tarnawski, S. Lassau (AM KS68577, PBI_OON 7696); 1 ♂, Nature Reserve, Mills Bay, Narooma, 36.20416°S, 150.12100°E, 10 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64758, PBI_OON 19612); 1 ♀, Nerrigundah Mt Road, Dampier State Forest, 36.12516°S, 149.95533°E, 10 Mar. 1999, R. Harris, H. Smith (AM KS68578, PBI_OON 7695); 2 ♂, No Name Fire Trail, Buckenbowra State Forest, 35.63850°S, 150.00166°E, 15 Mar. 1999, L. Wilkie, R. Harris, H. Smith (AM KS64760, PBI_OON 19621); 1 ♀, North Head Road, Murramarang National Park, 35.70416°S, 150.27166°E, 17 Mar. 1999, L. Wilkie, R. Harris (AM KS66937, PBI_OON 7554); 1 ♂, 3 ♀, Princes Highway, Corunna State Forest, 36.27466°S, 150.12216°E, 12 Mar. 1999, R. Harris, H. Smith (AM KS68216, PBI_OON 7621); 1 ♀, S of jct Quart Pot and Ross Ridge Roads, Mogo, 35.75466°S, 150.07400°E, 8 Mar. 1999, J. Tarnawski, S. Lassau (AM KS64762, PBI_OON 19620); 2 ♂, 11 ♀, S side of Durras Road, 2 km W of Durras, 35.65650°S, 150.26866°E, 17 Mar. 1999, J. Tarnawski, S. Lassau (AM KS68217, PBI_OON 7662); 2 ♂, Sydney Catchment Authority,

Darkes Forest Road-Fire Road No. 9E junction, near locked gate, 34.19150°S, 150.90600°E, 8 Dec. 1999, M. Shea (AM KS63404, PBI_OON 20562); 1 ♀, T-Ridge Road, Kioloa State Forest, 35.55466°S, 150.30716°E, 17 Mar. 1999, J. Tarnawski, S. Lassau (AM KS64765, PBI_OON 19616); 1 ♂, Woronora Dam Catchment, Fire Road No. 9, 34.19216°S, 150.90533°E, 14 Nov. 2000, G. Milledge, H. Smith (AM KS69370, PBI_OON 7608).

Etymology. This species is named for Helen Smith's sister-in-law, Margaret Smith (née Addis) for her support of conservation organisations.

Diagnosis. Males and females resemble those of *O. yorki* in body shape and males also have palpal bulb with prolaterally incised distal tip. Males can be distinguished by the elongated slim bulbal tip (Figs 33H, I). In females the epigastric area in dorsal view has a paddle-like sclerite (PSc) with straight arms, slightly bent at the end (Fig. 34G).

Description. *Male* (PBI_OON 07704, Figs 33A–J). Total length 1.63. Prosoma, mouthparts, abdominal scutae and palpal patella orange brown, legs pale orange. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.085; PME: 0.073; PLE: 0.058, ALE largest, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Sternum with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scutopedicel region lower than diameter of pedicel, with paired curved scutal ridges and additional median distal ridge. Palpal patella, 0.336 long, 0.206 wide, connection to femur at 0.49; bulb ventrally slightly bulging with elongated, retrolaterally curved and prolaterally incised distal tip (Fig. 33 I).

Female (PBI_OON 23553, Figs 34A–G). Total length 1.93. Eyes, ALE: 0.084; PME: 0.072; PLE: 0.056. Epigastric area ventral view, with wide slit-like opening; epigastric fold (EF) with tiny semicircular concavity; in dorsal view paddle-like sclerite (PSc) with straight arms, slightly bent at the end (Fig. 34G); nail-like process (Na)

small knob; globular appendix (GAp) a short knob.

Distribution. This species is known from coastal New South Wales.

Opopaea bushblitz Baehr, sp. nov.
(Figs 35A–J, 36A–G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Koorawatha Nature Reserve, eucalypt forest, litter, 34.03194°S, 148.59972°E, 437 m, 15 Nov. 2010, B. Baehr (AM KS116477, PBI_OON 23527). Allotype ♀: collected with holotype (AM KS116478, PBI_OON 23528).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, Bank of Merri Merri Creek, 2.5 km N of Quambone, 30.90633°S, 147.85933°E, 24 Nov.–14 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77489, PBI_OON 20166); 1 ♂, same data (AM KS77491, PBI_OON 20168); 1 ♀, ca. 40 km along Bruxner Highway from Bonshaw to Tenterfield; 150 m S of road, 29.00716°S, 151.50416°E, 22 Nov.–13 Dec. 2001, Michael G. Elliott (AM KS83451, PBI_OON 19765); 1 ♀, same data (AM KS83458, PBI_OON 19769); 1 ♂, same data (AM KS83448, PBI_OON 19772); 1 ♀, same data (AM KS83452, PBI_OON 19773); 1 ♂, 1 ♀, same data (AM KS83439, PBI_OON 19776); 1 ♂, Carinda-Walgett Road at turnoff to 'Allawa' Station, 30.12350°S, 147.93983°E, 25 Nov.–15 Dec. 1999, L. Wilkie *et al.* (AM KS77499, PBI_OON 20164); 1 ♂, Castlereagh Highway, 1.7 km N of junction with Gwydir Highway, 29.89233°S, 148.15933°E, 13 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77508, PBI_OON 20161); 2 ♂, Crown Res., 8.9 km along Bukkulla-Ashford Road, 29.42650°S, 151.06966°E, 22 Nov.–13 Dec. 2001, H. Doherty, M. Elliott (AM KS83445, PBI_OON 19770); 1 ♂, Gwydir Highway, 33.4 km NE of Walgett, opposite Calgary turnoff, 29.68483°S, 148.35833°E, 21 Nov.–11 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77507, PBI_OON 20169); 1 ♂, Koorawatha Nature Reserve, eucalypt forest, litter, 34.03194°S, 148.59972°E, 437 m, 15 Nov. 2010, B. Baehr (AM KS116479, PBI_OON 23529); 1 ♀, Kwiambal National Park, E side of park, 150 m S of road, 29.17433°S, 151.00300°E, 22 Nov.–13 Dec. 2001, H. Doherty, M. Elliott (AM KS83456, PBI_OON 19767); 1 ♀, same data (AM KS83455, PBI_OON 19775); 1 ♀, Linton Nature Reserve, 700 m W of Reserve entrance, 30.45633°S, 150.88533°E, 18 Nov.–9 Dec. 2001, H. Doherty, M. Elliott (AM KS83450, PBI_OON 19771); 1 ♂, 1 ♀, Linton Nature Reserve, SW corner of Reserve, 60 m E of road, 30.45750°S, 150.85766°E, 18 Nov.–9 Dec. 2001, H. Doherty, M. Elliott (AM KS83438, PBI_OON 19785); 1 ♀, Severn State Forest, Atholwood Loop Road, 29.07133°S, 151.00883°E, 22 Nov.–13 Dec. 2001, L. Wilkie, H. Smith (AM KS83604, PBI_OON 19127); 1

♂, same data (AM KS83442, PBI_OON 19766); 1 ♂, same data (AM KS83444, PBI_OON 19774).

Etymology. The specific name is a noun in apposition in honour of the Australian Biological Resources Study's BushBlitz program which supports taxonomic work and field excursions (www.bushblitz.org.au).

Diagnosis. Males and females resemble those of *O. gerstmeieri* in having a flat body, with scuto-pedicle region less than ½ of diameter of pedicle and paired scutal ridges slightly arched, connected medially. Males can be distinguished by the short medially striated bulbous tip (Fig. 35H). In females the epigastric area in ventral view has epigastric fold (EF) with small semicircular concavity and tiny triangular knob (Figs 36F, G).

Description. *Male* (PBI_OON 19774, Figs 35A–J). Total length 1.18. Prosoma, mouthparts, abdominal scutae and legs pale orange. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, sides striated; lateral margin rebordered, with denticles. Eyes small, ALE: 0.052; PME: 0.053; PLE: 0.046, PME largest, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrows with rows of small pits. Abdomen, scuto-pedicle region less than ½ diameter of pedicle, with paired curved scutal ridges connected at middle. Palpal patella 0.220 long, 0.117 wide, connected to femur at 0.40; bulb ventrally strongly bulging, tip short spatulate, medially striated, 'fenestra' wide (Figs 35H, I).

Female (PBI_OON 19769, Figs 36A–G). Total length 1.47. Eyes, ALE: 0.056; PME: 0.052; PLE: 0.045, ALE largest. Epigastric area, ventral view, epigastric fold (EF) with small semicircular concavity and tiny triangular knob; in dorsal view paddle-like sclerite (PSc) with straight arms, bent at the end; nail-like process (Na) long conical; globular appendix (GAp) a short knob-shaped.

Distribution. This species is known only from inland New South Wales.

Opopaea gerstmeieri Baehr, sp. nov.
(Figs 37A–J, 38A–G)

Material examined. Holotype ♂: **AUSTRALIA: New South Wales:** Girilambone Road, 5.4 km S of Monkey Bridge, Casuarina, litter, 30.89200°S, 147.05533°E, 13, Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS116464, PBI_OON 23608). Allotype ♀: collected with holotype (AM KS67747, PBI_OON 07588).

Other material examined. **AUSTRALIA: New South Wales:** 1 ♂, 23.5 km N of Mulwala, 'Savernake' Station, 35.77416°S, 146.02433°E, D. Freudenberger (AM KS84560, PBI_OON 20198); 1 ♂, Coleambally Irrigation Area, 34.92633°S, 146.05833°E, 16 Dec. 1998, L. Wilkie, S. Priday (AM KS67715, PBI_OON 7590); 1 ♂, Coleambally Irrigation Area, 34.93500°S, 145.77516°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS68929, PBI_OON 7688); 1 ♂, Coleambally Irrigation Area, 35.00033°S, 145.82483°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS68938, PBI_OON 7693); 1 ♂, Pooginook Wildlife Refuge, 34.85916°S, 145.70083°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS67747, PBI_OON 07588); 1 ♀, same data (AM KS67735, PBI_OON 07597); 1 ♂, same data (AM KS58264, PBI_OON 7618); 1 ♀, Pooginook Wildlife Sanctuary, 34.90383°S, 145.66833°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS67578, PBI_OON 7647); 1 ♂, same data (AM KS68955, PBI_OON 7700); 1 ♀, Pooginook Wildlife Refuge, 34.87100°S, 145.68733°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS68980, PBI_OON 7706).

Etymology. This species is named for colleague and friend Prof. R. Gerstmeier for his love of the Australian fauna.

Diagnosis. Males and females resemble those of *O. bushblitz* in having a flat body but can be distinguished by strongly reduced eyes; postepigastric scutum with longitudinal concavity covering ½ of its lengths and weak longitudinal ridge; lateral apodemes ½ as long as postepigastric scutum. In males the palpal bulb has two strong basomedial setae (Fig. 37H), 'fenestra' ending in a large fold, and with a short medially bent tip (Fig. 37 I). In females the epigastric area in ventral view has epigastric fold (EF) with well developed triangular extension and small triangular concavity (Fig. 38 F–G).

Description. *Male* (PBI_OON 23608, Figs 37A–J). Total length 1.21. Prosoma, mouthparts, abdominal scutae and palpal patella pale orange, legs

yellow. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes reduced to pale spots, ALE: 0.054; PME: 0.053; PLE: 0.037, ALE largest, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME touching. Sternum longer than wide, with barely visible radial furrows between coxae I–II, II–III, III–IV, furrow smooth. Abdomen, scuto-pedicel region less than ½ of diameter of pedicel, with paired medially connected scutal ridges; postepigastric scutum weakly sclerotized, with longitudinal concavity covering ½ of its length and weak longitudinal ridge; lateral apodemes 1/2 as long as postepigastric scutum; concavity covered with short setae. Palpal patella 0.206 long, 0.115 wide, connection to femur at 0.43; bulb ventrally slightly bulging, with two strong basomedial setae, 'fenestra' ending in large fold, tip short, medially bent.

Female (PBI_OON 07588, Figs 38A–G). Total length 1.26. Eyes, ALE: 0.050; PME: 0.045; PLE: 0.033. Epigastric area, ventral view, epigastric fold (EF) with well-developed triangular extension and small triangular concavity; in dorsal view paddle-like sclerite (PSc) strongly bent half way; nail-like process (Na) with hood and small conical end; globular appendix (GAp) a long, triangular extension.

Distribution. This species is known only from south and central New South Wales.

Opopaea lebretoni Baehr, sp. nov.
(Figs 39A–J, 40A–G)

Material examined. Holotype ♂: **AUSTRALIA: New South Wales:** Lower Murray-Darling Region, Boolaboolka Station, shrubs, litter, 32.66850°S, 142.90183°E, 25–29 Oct. 1999, M. Le Breton (AM KS116474, PBI_OON 20474). Allotype ♀: Lower Murray-Darling Region, Bidura Station, chenopod mallee shrubland, litter, 34.10950°S, 143.22116°E, 6–10 Mar. 2000, M. Le Breton (AM KS116473, PBI_OON 07596).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, Lower Murray-Darling Region, Bidura Station, 34.10950°S, 143.22116°E, 6–10 Mar. 2000, M. Le Breton (AM KS91758, PBI_OON 20154); 1 ♂, Tapio Station, 34.03916°S, 142.06783°E, 20–24 Mar. 2000, M. Le Breton (AM KS91667, PBI_OON 20153); 1 ♂, Willotia Station, 32.83500°S, 142.28816°E, 14–18 Feb. 2000, M. Le Breton (AM KS91560, PBI_OON 20151); 3 ♂, 2 ♀, Willotia Station, 32.88566°S, 142.23500°E, 14–18 Feb. 2000, M. Le Breton (AM KS91676, PBI_OON 20152).

Etymology. This species is named for Matthew Le Breton who collected the types as well as many other Oonopidae in the Lower Murray Darling Survey from which this material came.

Diagnosis. Males and females resemble those of *O. martini* in having a high abdomen with scuto-pediceal region higher than diameter of pedicel, but can be distinguished by the larger eyes, the presence of lateral extensions on pedicel, the scuto-pediceal region with pairs of scutal ridges (Fig. 39C). Males similarly have a strongly bulging palpal bulb with a distal patch of plumose setae, but can be distinguished by the bulbal tip with small prolateral incision (Fig. 39 I). In females the epigastric area in ventral view has epigastric fold (EF) with well developed triangular extension and small triangular concavity (Figs 40F, G).

Description. *Male* (PBI_OON 20474, Figs 39A–J). Total length 1.34. Prosoma, mouthparts, abdominal scutae and legs orange, eyes with black border. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes, ALE: 0.056; PME: 0.062; PLE: 0.053, PME largest, ALE circular, PME squared, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME touching. Sternum as long as wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scuto-pediceal region higher than diameter of pedicel with paired curved scutal ridges. Palpal patella 0.238 long, 0.138 wide, connection to femur at 0.40; bulb ventrally strongly bulging, with distal

patch of plumose setae, tip medially bent, with small prolateral incision.

Female (PBI_OON 07596, Figs 40A–G). Total length 1.47. Eyes, ALE: 0.065; PME: 0.067; PLE: 0.048. Epigastric area, ventral view, epigastric fold (EF) with well developed triangular extension and small triangular concavity; in dorsal view paddle-like sclerite (PSc) with straight arms, bent at the end; nail-like process (Na) small drop-shaped; globular appendix (GAp) with wide hood and long, triangular extension (Fig. 40F, G).

Distribution. This species is known only from the Lower Murray-Darling Region of central New South Wales.

Opopaea linea Baehr, sp. nov.
(Figs 41A–J, 42A–G)

Material examined. Holotype ♂: AUSTRALIA: *Queensland*: Mt Cotton, Sandy Creek Cons Area, litter, 40 m, 27.98333°S, 153.40000°E, 1–21 Dec. 2009, R. Raven (QM S95145, PBI_OON 23459). Allotype ♀: collected with holotype (QM S88227, PBI_OON 23460).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♀, 'Wyninebah' Station, 0.3 km past stockyards, 300 m E of Road, 30.35833°S, 147.48750°E, 25 Nov.–15 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77440, PBI_OON 7781); 1 ♀, 0.7 km N of turnoff to Wyndabyne Station, Warren-Quambone Road, 31.13533°S, 147.84100°E, 13 Dec. 1999, L. Wilkie *et al.* (AM KS77448, PBI_OON 7785); 2 ♀, same data (AM KS77447, PBI_OON 7803); 1 ♂, 1.05 km ESE of Murrawombie Bridge, Quinine Park, 31.17016°S, 147.13466°E, 13 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77433, PBI_OON 7792); 1 ♂, 150 m N of bridge over Gingham Watercourse S of Weemelah, 29.22166°S, 149.26733°E, 26 Nov.–16 Dec. 1999, L. Wilkie *et al.* (AM KS77456, PBI_OON 7791); 1 ♀, 16.3 km NE along Coonamble-Barradine Road, Nebea Station, 30.90133°S, 148.54283°E, 24 Nov.–14 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77436, PBI_OON 7795); 1 ♀, same data (AM KS77435, PBI_OON 7797); 1 ♀, 1 km along access road to Cawwell Station, 29.05850°S, 147.06716°E, 26 Nov.–16 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77462, PBI_OON 7793); 1 ♀, 2.5 km NW of Gin Gin on Road to 'Riverview' station, 31.90216°S, 148.05683°E, 22 Nov.–12 Dec. 1999, L. Wilkie *et al.* (AM KS77442, PBI_OON 7805); 1 ♀, 200 m E of Mungindi Road, 3.3 km past turnoff to Abeddar Station, 29.18666°S, 148.89066°E, 27 Nov.–17 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77441, PBI_OON 7804); 1 ♂, 2 ♀, 7.5 km NW of Gin Gin,

- Wambianna Station, 31.87116°S, 148.02266°E, 22 Nov.–12 Dec. 1999, L. Wilkie *et al.* (AM KS77443, PBI_OON 7782); 1 ♂, same data (AM KS87260, PBI_OON 20194); 1 ♀, same data (AM KS77444, PBI_OON 20194); 1 ♂, 9.2 km N of Carinda, Douglas Park Station, 30.40816°S, 147.74166°E, 25 Nov.–15 Dec. 1999, L. Wilkie *et al.* (AM KS77452, PBI_OON 7783); 1 ♂, Attunga State Forest, 30.92333°S, 150.92350°E, 16 Nov.–7 Dec. 2001, G. Carter (AM KS83593, PBI_OON 7666); 1 ♀, Attunga State Forest, pass SE of Attunga State Forest, back road, 30.97216°S, 150.92466°E, 16 Nov.–7 Dec. 2001, G. Carter (AM KS83600, PBI_OON 7677); 1 ♀, Attunga State Forest, S of Ardey Range, W edge of State Forest, opp. 'Tralee', 30.93333°S, 150.90316°E, 15 Nov.–6 Dec. 2001, G. Carter (AM KS83598, PBI_OON 7669); 1 ♀, Attunga State Forest, SE side of State Forest, E of road up slope, 30.94016°S, 150.92483°E, 16 Nov.–07 Dec. 2001, G. Carter (AM KS83599, PBI_OON 7664); 1 ♂, Barraba-Bundarra Road, W bank of Ironbark Ck, 30.27150°S, 150.79050°E, 18 Nov.–9 Dec. 2001, L. Wilkie, H. Smith (AM KS83592, PBI_OON 7667); 1 ♀, between Kootingal and Tamworth, crown res. 200 m past tip, 31.06750°S, 151.03400°E, 15 Nov.–6 Dec. 2001, G. Carter (AM KS83597, PBI_OON 7665); 1 ♂, 2 ♀, same data (AM KS83591, PBI_OON 7680); 1 ♂, Cameron Lane, 4.6 km W of Burren-Pokataroo Road jctn, 29.80950°S, 148.94166°E, 30 Nov.–20 Dec. 1999, L. Wilkie *et al.* (AM KS77457, PBI_OON 7778); 1 ♂, Carinda-Walgett Road at turnoff to 'Allawa' Station, 30.12350°S, 147.93983°E, 25 Nov.–15 Dec. 1999, L. Wilkie *et al.* (AM KS77451, PBI_OON 7794); 1 ♂, Castlereagh Highway, 12 km N of junction with Gwydir Highway, 29.80900°S, 148.12600°E, 13 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77459, PBI_OON 7796); 1 ♂, Castlereagh Highway, 5.75 km N of junction with Gwydir Highway, 29.87000°S, 148.13866°E, 13 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77460, PBI_OON 7784); 1 ♂, same data (AM KS77461, PBI_OON 7801); 1 ♂, Castlereagh Highway, 5 km S of entrance to Bairnkine Station, 29.81833°S, 148.12200°E, 26 Nov.–16 Dec. 1999, L. Wilkie *et al.* (AM KS77453, PBI_OON 7786); 1 ♂, same data (AM KS77454, PBI_OON 7789); 1 ♂, same data (AM KS77455, PBI_OON 7799); 1 ♂, Coleambally Irrigation Area, 34.93500°S, 145.77516°E, 28 Apr. 1999, L. Wilkie, S. Priday (AM KS67611, PBI_OON 7642); 1 ♂, Coleambally Irrigation Area, 34.73766°S, 145.93800°E, 15 Dec. 1998, L. Wilkie, S. Priday (AM KS68973, PBI_OON 7715); 1 ♂, Coonamble-Trembone Road, 2.4 km N of Gilgooma turnoff, 30.67216°S, 148.45033°E, 24 Nov.–14 Dec. 1999, L. Wilkie *et al.* (AM KS77449, PBI_OON 7798); 1 ♀, Crown Res., 2 km along Tintinhull Road from Danuka Road, 31.06700°S, 150.98750°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS83596, PBI_OON 7673); 2 ♀, Darling River, 1.5 km S of 'Trilby' Station homestead, 30.65116°S, 144.93350°E, 1–21 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77458, PBI_OON 7777); 1 ♀, Gidginbilla Station, off Castlereagh Highway at Combogolong Bridge, 30.42266°S, 148.20300°E, 24 Nov.–14 Dec. 1999, L. Wilkie *et al.* (AM KS77450, PBI_OON 7790); 1 ♀, Girilambone Road, 5.4 km S of Monkey Bridge, 30.89200°S, 147.05533°E, 13 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77434, PBI_OON 7806); 1 ♂, Green and Banders Road, 3.7 km N of Carinda-Brewarrina Road jctn, 30.38983°S, 147.48733°E, 25 Nov.–15 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77439, PBI_OON 7800); 1 ♀, Middle of Attunga State Forest, end of Archery Trail, 30.92583°S, 150.92000°E, 16 Nov.–7 Dec. 2001, G. Carter (AM KS83601, PBI_OON 7668); 2 ♂, most northern part of Attunga State Forest, far end of back trail, south of The Horse Arm Creek, 30.91816°S, 150.92316°E, 16 Nov.–07 Dec. 2001, G. Carter (AM KS83594, PBI_OON 7663); 1 ♂, Oak Creek Nature Reserve, S boundary of Reserve, 31.11700°S, 150.61900°E, 17 Nov.–8 Dec. 2001, G. Carter (AM KS83595, PBI_OON 7686); 1 ♂, Pilliga region, 'Teranna', 30.03733°S, 148.75783°E, I. Oliver (AM KS81024, PBI_OON 20192); 1 ♂, S side of Coonamble-Barradine Road, opposite Pilliga turnoff, 30.94233°S, 148.42483°E, 24 Nov.–14 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77437, PBI_OON 7776); 1 ♂, Sturt National Park, 29.13333°S, 141.50000°E, 25 Sept. 1997, G. Osler (AM KS85501, PBI_OON 20202); 1 ♂, Trilby Station, Darling River, 2.7 km S of homestead, 30.64133°S, 144.92083°E, 1–21 Dec. 1999, F. Christie *et al.* (AM KS77463, PBI_OON 7787); 1 ♀, Warren-Carinda Road, 7.1 km W of Mt. Foster Road, sign, 31.21866°S, 147.58333°E, 23 Nov.–13 Dec. 1999, L. Wilkie *et al.* (AM KS77446, PBI_OON 7780); 1 ♂, Warren-Carinda Road, 7.1 km W of Mt. Foster road sign, 31.21866°S, 147.58333°E, 23 Nov.–13 Dec. 1999, L. Wilkie (AM KS77445, PBI_OON 7802); 1 ♀, Wyrabalong National Park, 33.27450°S, 151.54000°E, 27 Nov. 1997, L. Wilkie (AM KS58496, PBI_OON 19646). *Queensland*: 1 ♂, Albinia National Park, Melaleuca woodland, litter, 24.73333°S, 148.75000°E, 226 m, 31 Oct.–17 Nov. 2010, C. Lambkin, N. Starick (QM S90650, PBI_OON 19463); 1 ♂, Lonesome National Park, eucalypt woodland, litter, 25.81666°S, 148.98333°E, 585 m, 3–23 Nov. 2010, C. Lambkin, N. Starick (QM S90640, PBI_OON 20385).
- Etymology.** The specific name is a Latin adjective meaning line, referring to postepigastric scutum with elevated median line of short, plumose setae in males.
- Diagnosis.** Males and females resemble those of *O. magna* in body shape, scuto-pedicle region about diameter of pedicle and in males by having a palpal tip with prolateral incision. Males can be distinguished by the postepigastric scutum with elevated median line of short, plumose setae (Fig. 41C). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) with slightly bowed arms (Fig. 42G).

Description. *Male* (PBI_OON 23459, Figs 41A–J). Total length 1.48. Prosoma, mouthparts, abdominal scutae, legs and palpal patella orange brown. Carapace high-shouldered, broadly oval in dorsal view, with angular posterolateral corners, posterolateral edge with pair of pits, top smooth, sides striated, lateral margin rebordered, without denticles. Eyes, ALE: 0.071; PME: 0.084; PLE: 0.053, PME largest, ALE circular, PME squared; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Chelicerae straight, paturon with laminate groove. Abdomen, scuto-pediceal region about diameter of pedicel, with paired curved scutal ridges. Palpal patella 0.280 long, 0.160 wide, connection to femur at 0.56; bulb ventrally bulging; tip with two ventral ridges, and deep prolateral incision.

Female (PBI_OON 23460 Fig. 42A–G). Total length 1.62. Eyes, ALE: 0.074; PME: 0.070; PLE: 0.062. Epigastric area, ventral view, epigastric fold (EF) evenly bowed, with small median knob and small median concavity; in dorsal view paddle-like sclerite (PSc) with slightly bowed arm; nail-like process (Na) long conical; globular appendix (GAP) mushroom-shaped (Fig. 42G).

Distribution. This species is widely distributed in central New South Wales and Queensland.

Opopaea magna Baehr, sp. nov.
(Figs 43A–J, 44A–G)

Material examined. Holotype ♂: AUSTRALIA: New South Wales: Styx River State Forest, 30.72400°S, 152.10533°E, Jan. 1993, I. Oliver (AM KS74678, PBI_OON 07514). Allotype ♀: Mt Boss State Forest (south plateau), 31.20000°S, 152.40000°E, no date, G.A. Webb (AM KS116471, PBI_OON 20569).

Other material examined. AUSTRALIA: New South Wales: 1 ♂, Mt Boss State Forest (south plateau), 31.20000°S, 152.40000°E, no date, G.A. Webb (AM KS42895, PBI_OON 20569); 1 ♂, Styx River State Forest, 30.73450°S, 152.11700°E, Jan. 1993, I. Oliver (AM KS89876, PBI_OON 20145).

Etymology. The specific name is a Latin adjective *magna* meaning large, referring to the large body size.

Diagnosis. Males and females resemble those of *O. linea* in body shape and scuto-pediceal region about diameter of pedicel but can be distinguished by their much larger size and an additional wide distal ridge at scuto-pediceal region. Males similarly have a palpal tip with prolateral incision but can be distinguished by the lack of postepigastric scutum with elevated median line of short, plumose setae and a long bulbous tip with deep rounded prolateral incision (Fig. 43 I). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) with straight arms (Fig. 44G).

Description. *Male* (PBI_OON 07514, Figs 43A–J). Total length 1.89. Prosoma, mouthparts, abdominal scutae and legs orange brown. Carapace broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated, lateral margin straight, rebordered, without denticles. Eyes, ALE: 0.089; PME: 0.091; PLE: 0.070, PME largest, ALE circular, PME oval, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, Chelicerae straight, paturon with laminate groove. Abdomen ovoid; scuto-pediceal region about diameter of pedicel, with paired curved scutal ridges and additional wide distal ridge. Palpal patella 0.382 long, 0.219 wide, connection to femur at 0.50, bulb narrow, slightly bulging, with dorsal patch of plumose setae, tip elongated, with medially bent, fused fold and large incision (Figs 43H, I).

Female (PBI_OON 20569, Figs 44A–G). Total length 2.02. Eyes, ALE: 0.089; PME: 0.078; PLE: 0.073. Epigastric area, ventral view, epigastric fold (EF) widely triangular, with small knob; in dorsal view paddle-like sclerite (PSc) with slightly bent straight arms; nail-like process

(Na) small; globular appendix (GAp) conical (Fig. 44G).

Distribution. This species is only known from north eastern New South Wales.

Opopaea margaretehoffmannae Baehr & Smith, sp. nov.
(Figs 45A–J)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Sturt National Park, 29.10716°S, 141.96666°E, 22 Sept. 1997, A. Pik (AM KS78836, PBI_OON 20188).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, Sturt National Park, 29.13333°S, 141.50000°E, 25 Sept. 1997, M. Gillings (AM KS85488, PBI_OON 20199); 1 ♂, Sturt National Park, 29.13333°S, 141.50000°E, 29 Sept. 1997, M. Dangerfield (AM KS85592, PBI_OON 20203); 1 ♂, Sturt National Park, 29.27600°S, 142.15300°E, 25 Sept. 1997, M. Dangerfield (AM KS79490, PBI_OON 20208).

Etymology. This species is named in honour of Margarete Hoffmann, the mother of Barbara Baehr, for her interest in our work.

Diagnosis. Males resemble those of *O. gerstmeieri* in having a flat body and two strong prolateral setae at the base of the bulb but can be distinguished by the larger eyes and the lack of a longitudinal concavity at the ventral scute, a 'fenestra' without a long fold and a deeply incised prolateral tip (Figs 45H, I).

Description. *Male* (PBI_OON 20188, Figs 45A–J). Total length 1.35. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.070; PME: 0.067; PLE: 0.053, ALE largest, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow smooth. Abdomen, scuto-pedicel region about ½ of diameter of pedicel, with paired curved scutal ridges. Palpal patella 0.265 long, 0.154 wide connection to femur at 0.53; bulb ventrally

slightly bulging with two strong prolateral setae at base, 'fenestra' without fold, prolateral tip deeply incised (Fig. 45H).

Female. Unknown.

Distribution. This species is known only from north-western New South Wales.

Opopaea martini Baehr, sp. nov.
(Figs 46A–J, 47A–G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Lower Murray-Darling region, Boree Plains Station, 33.63916°S, 143.38933°E, 1 Oct. 1998, M. Le Breton (AM KS71226, PBI_OON 20576). Allotype ♀: Boona State Forest, 34.72050°S, 145.99316°E, 15 Dec. 1998, L. Wilkie, S. Priday (AM KS58233, PBI_OON 07628).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, 23.5 km N of Mulwala, 'Savernake' Station, 35.77416°S, 146.02433°E, Nov. 2000, D. Freudenberger (AM KS84559, PBI_OON 20201); 1 ♂, Coleambally Irrigation Area, 34.70250°S, 146.04200°E, 28 Apr. 1999, L. Wilkie (AM KS67265, PBI_OON 7562).

Etymology. The specific name is for Dr Martin Baehr for his love of the Australian fauna.

Diagnosis. Males and females resemble none of the New South Wales species but rather resemble those of *O. robusta* from Western Australia in having PME largest, a high shouldered carapace and scuto-pedicel region high, about 1 ½ diameter of pedicel without scutal ridges. Males can be distinguished by a compact bulb which is ventrally strongly bulging, with dorsal patch of plumose setae with suddenly narrowed, medially bent tip (Fig. 46 I). In females the epigastric area in ventral view has epigastric fold (EF) widely triangular with wide median concavity Fig. 47G).

Description. *Male* (PBI_OON 20576, Figs 46A–J). Total length 2.59. Prosoma, mouthparts, abdominal scutae, palpal patella and legs orange brown. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, with angular posterolateral corners, top granulated, sides weakly striated. Eyes, ALE: 0.089; PME: 0.093; PLE: 0.075, PME largest, ALE circular, PME circular; posterior eye row recurved from above, straight from front; ALE separated by more than their diameter, ALE–

PLE separated by less than ALE radius, PME separated by less than their radius, PLE-PME separated by less than PME radius. Sternum as long as wide, with weak radial furrows between coxae I-II, II-III, III-IV. Abdomen, pedicel tube ribbed, without dorsolateral triangular extensions, scuto-pedicel region about $1\frac{1}{2}$ diameter of pedicel without scutal ridges. Palpal patella 0.361 long, 0.215 wide, connection to femur at 0.52; bulb compact, ventrally strongly bulging, with dorsal patch of plumose setae, suddenly narrowed, medially bent tip.

Female (PBI_OON 07628, Figs 47A-G). Total length 1.95. Eyes, ALE: 0.064; PME: 0.075; PLE: 0.064. Epigastric area, ventral view, epigastric fold (EF) widely triangular with wide median concavity; in dorsal view paddle-like sclerite (PSc) with strong arms bent at the end (Fig. 47G); nail-like process (Na) big; globular appendix (GAP) divided into wide triangular hood and elongated extension.

Distribution. This species is known only from south-western New South Wales.

Opopaea michaeli Baehr & Smith, sp. nov.
(Figs 48A-J)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Sturt National Park, 29.1333°S, 141.5000°E, 29 Sept. 1997, M. Gillings (AM KS85544, PBI_OON 20204).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, Sturt National Park, 29.04116°S, 141.64116°E, 24 Sept. 1997, M. Dangerfield (AM KS85427, PBI_OON 20197); 1 ♂, Sturt National Park, 29.20666°S, 141.02316°E, 29 Sept. 1997, I. Oliver (AM KS79340, PBI_OON 20207).

Etymology. The specific name is a noun in apposition in honour of Helen Smith's brother, Michael Smith, for protection and repatriation of household spiders in an otherwise often hostile environment.

Diagnosis. Males resemble those of *O. suelewisae* in having a flat body with scuto-pedicel region about $\frac{1}{2}$ of diameter of pedicel but can be distinguished by carapace top and sides finely reticulate and bulb with broad tip and dorsally directed prolateral fold, striated on top (Fig. 48 I).

Description. *Male* (PBI_OON 20204, Figs 48A-J). Total length 1.64. Prosoma, mouthparts, abdominal scutae and legs pale orange. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, top and sides finely reticulate; lateral margin rebordered, without denticles; pars thoracica with a horizontal row of at least 8 stronger spines. Eyes, ALE: 0.076; PME: 0.072; PLE: 0.060, ALE largest, ALE circular, PME oval; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with weak radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits, surface finely reticulate, microsculpture covering entire surface. Abdomen, scuto-pedicel region about $\frac{1}{2}$ of diameter of pedicel, with paired curved scutal ridges, ridges short, weak; postepigastric scutum weakly sclerotized, with long posteriorly directed lateral apodemes, about $\frac{1}{2}$ of the abdomen long. Palpal patella 0.272 long, 0.156 wide, connection to femur at 0.62; bulb ventrally slightly bulging, tip with dorally directed prolateral fold striated on top (Fig. 48 I).

Female. Unknown.

Distribution. This species is known only from north-western New South Wales.

Opopaea milledgei Baehr, sp. nov.
(Figs 49A-J, 50A-G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Devils Pulpit State Forest, 29.25750°S, 153.22433°E, 1 Jan. 1997, A. York (AM KS102819, PBI_OON 20478). Allotype ♀: collected with holotype (AM KS116429, PBI_OON 23604).

Other material examined. AUSTRALIA: *New South Wales*: 2 ♂, Devils Pulpit State Forest, litter, 29.25750°S, 153.22433°E, 1 Feb. 1997, A. York (AM KS102724, PBI_OON 19358); 3 ♂, 1 ♀, same data (AM KS102732, PBI_OON 19364); 1 ♂, same data (AM KS102736, PBI_OON 19366); 1 ♂, same data (AM KS102733, PBI_OON 19370); 2 ♂, same data (AM KS102734, PBI_OON 19371); 3 ♂, 1 ♀, same data (AM KS102713, PBI_OON 19373); 1 ♂, same data except 29.27066°S, 153.17166°E (AM KS102711, PBI_OON 19375); 6 ♂, 1 ♀, same data (AM KS102695, PBI_OON 19380); 1 ♂, same data

(AM KS102685, PBI_OON 19450); 2 ♂, same data (AM KS102659, PBI_OON 19461); 1 ♀, same data (AM KS102674, PBI_OON 19471); 1 ♂, same data (AM KS102663, PBI_OON 19472); 1 ♂, same data (AM KS102834, PBI_OON 20470); 1 ♀, 29.25750°S, 153.22433°E, 1 Jan. 1997, A. York (AM KS102832, PBI_OON 20473); 1 ♂, same data (AM KS102835, PBI_OON 20479); 3 ♂, same data (AM KS102824, PBI_OON 20486); 1 ♂, 1 ♀, same data (AM KS116430, PBI_OON 23605); 1 ♂, Doubleduke State Forest, litter, 29.13833°S, 153.19000°E, 1 Feb. 1997, A. York (AM KS102728, PBI_OON 19367); 1 ♀, 29.17266°S, 153.18566°E, 1 Feb. 1997, A. York (AM KS102817, PBI_OON 20472); 1 ♂, same data except 29.14150°S, 153.17150°E, 1 Feb. 1997, A. York (AM KS102827, PBI_OON 20476); 1 ♂, same data (AM KS102826, PBI_OON 20488); 1 ♂, Mororo State Forest, litter, 29.31766°S, 153.23800°E, 1 Feb. 1997, A. York (AM KS102716, PBI_OON 19379); 1 ♂, same data (AM KS102714, PBI_OON 19394); 2 ♀, Myrtle State Forest, litter, 29.19200°S, 153.01833°E, 1 Feb. 1997, A. York (AM KS102705, PBI_OON 19393); 3 ♀, same data (AM KS102657, PBI_OON 19469); 1 ♀, same data (AM KS102669, PBI_OON 19476); 1 ♀, Severn State Forest, Atholwood Loop Road, 29.07133°S, 151.00883°E, 22 Nov.–13 Dec. 2001, L. Wilkie, H. Smith (AM KS83603, PBI_OON 19128).

Etymology. This species is named for Graham Milledge the collection manager in the Arachnology Section of the Australian Museum, who has collected many goblin spiders.

Diagnosis. Males and females resemble those of *O. suelewisae* in having a flat body, carapace top smooth and sides striated and males with a thin medially bent palpal tip; both sexes can be distinguished by the much larger eyes and endites twice as long as wide. Males have the strong tooth-like projection at anteriorlateral part (Fig. 49F) and a longer bulbal tip (Fig. 49 I). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) with straight arms only bent at the end (Fig. 50G).

Description. *Male* (PBI_OON 20478, Figs 49A–J). Total length 1.29. Prosoma, mouthparts and abdominal scutae pale orange, palpal patella orange brown, legs yellow. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes, ALE: 0.055; PME: 0.063; PLE: 0.053, PME largest, ALE circular, PME squared; posterior eye row straight from above, procurved from front; ALE separated by their radius to diameter, ALE–PLE separated by

less than ALE radius, PME touching throughout most of their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, surface smooth, with posterior hump between coxae IV. Abdomen, scuto-pedicel region about diameter of pedicel, with strongly reduced paired curved scutal ridges. Palpal patella 0.254 long, 0.149 wide, connection to femur at 0.52; bulb ventrally slightly bulging with long tip, bent medially (Fig. 49 I).

Female (PBI_OON 23604, Fig. 50A–G). Total length 1.42. Eyes, ALE: 0.064; PME: 0.055; PLE: 0.054. Epigastric area, ventral view chitinized area (Ch) a bowed ridge with small median knob; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) narrow, conical; globular appendix (GAp) divided into small hood and broad drop-shaped extension (Fig. 50G).

Distribution. This species is known only from the north east of New South Wales.

Opopaea nitens Baehr, sp. nov.
(Figs 51A–J, 52A–F)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Sturt National Park, 29.08950°S, 141.86716°E, 26 Sept. 1997, M. Dangerfield (AM KS78572, PBI_OON 20190). Allotype ♀: Sturt National Park, 29.27100°S, 142.28816°E, 23 Sept. 1997, M. Henery (AM KS83046, PBI_OON 7737).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♀, Sturt National Park, 29.27600°S, 142.15316°E, 25 Sept. 1997, M. Gillings (AM KS79447, PBI_OON 7736); 1 ♂, Sturt National Park, 29.27600°S, 142.15316°E, 25 Sept. 1997, M. Henery (AM KS79401, PBI_OON 7740).

Etymology. The specific name is a Latin adjective meaning polished, referring to the shiny surface of the body.

Diagnosis. Males resemble those of *O. simplex* in having a flat body, but can be distinguished from other species by the lack of radial furrows between coxae I–II, II–III, III–IV, the lack of infra-coxal grooves with posterior openings at lateral margin of sternum (Fig. 51B), the medially constricted bulb with a visible seam between cymbium and bulb and femur subbasally

attached to patella (Fig. 51H, J). In females the epigastric area in ventral view has epigastric fold (EF) widely bowed, with small knob (Fig. 52F).

Description. *Male* (PBI_OON 20190, Figs 51A–J). Total length 1.23. Prosoma, mouthparts, abdominal scutae and legs pale orange. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with rounded posterolateral corners, top shiny, sides slightly reticulated; lateral margin rebordered. Eyes, ALE: 0.057; PME: 0.051; PLE: 0.038, ALE largest, ALE circular, PME squared; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME touching. Sternum longer than wide, without radial furrows between coxae I–II, II–III, III–IV, surface shiny, with distinct marginal seam but without infra-coxal grooves and anterior and posterior openings (Fig. 51B). Abdomen, scuto-pedicle region low, less than $\frac{1}{2}$ of diameter of pedicle, with median scutal ridge (Fig. 51G). Palpal femur subbasally attached to patella (Fig. 51J); patella 0.132 long, 0.092 wide, connection to femur at 0.32; with distal patch of plumose setae, bulb medially constricted with a visible seam between cymbium and bulb, with thin medially bent tip, ‘fenestra’ weak (Fig. 51H).

Female (PBI_OON 07737, Fig. 52A–F). Total length 1.33. Eyes, ALE: 0.050; PME: 0.054; PLE: 0.038. Epigastric area, ventral view, epigastric fold (EF) widely bowed, with small knob (Fig. 52F).

Distribution. This species is known only from north-western New South Wales.

Opopaea otto Baehr, sp. nov.
(Figs 53A–J, 54A–G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Bulls Ground State Forest, litter, 31.55000°S, 152.63333°E, 1 Oct. 1999, A. York (AM KS102552, PBI_OON 19282). Allotype ♀: collected with holotype (AM KS116431, PBI_OON 23606).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, Bulls Ground State Forest, litter, 31.55000°S, 152.63333°E, 1 Feb. 2001, A. York (AM KS102602, PBI_OON 19227); 1 ♀, same data except

1 Oct. 1999 (AM KS102604, PBI_OON 19236); 1 ♂, same data (AM KS102557, PBI_OON 19275); 1 ♂, same data (AM KS102588, PBI_OON 19242); 2 ♂, same data (AM KS102526, PBI_OON 19304); 2 ♂, same data (AM KS102532, PBI_OON 19305); 1 ♂, 1 Apr. 2000 (AM KS102592, PBI_OON 19256); 1 ♂, 1 ♀, same data (AM KS102594, PBI_OON 19263); 1 ♂, same data (AM KS102533, PBI_OON 19291); 1 ♀, same data (AM KS116432, PBI_OON 23607); 1 ♂, same data except 10 Feb. 1991 (AM KS43385, PBI_OON 20119); 1 ♀, same data (AM KS43390, PBI_OON 20139); 1 ♂, same data except Nov. 2000 (AM KS78242, PBI_OON 20124); 1 ♂, 2 ♀, same data (AM KS78244, PBI_OON 20135); 1 ♀, same data (AM KS78243, PBI_OON 20141); 1 ♂, 1 ♀, same data (AM KS78252, PBI_OON 20121); 1 ♀, same data (AM KS78253, PBI_OON 20134); 1 ♀, same data (AM KS78246, PBI_OON 20123); 1 ♀, same data (AM KS78256, PBI_OON 20127); 3 ♂, same data (AM KS78257, PBI_OON 20147); 1 ♀, same data (AM KS78260, PBI_OON 20131); 1 ♀, same data (AM KS78261, PBI_OON 20136); 1 ♀, same data (AM KS78262, PBI_OON 20132); 3 ♂, same data (AM KS78263, PBI_OON 20143); 1 ♀, same data (AM KS78264, PBI_OON 20144); 1 ♂, 1 ♀, same data (AM KS78265, PBI_OON 20138); 1 ♂, Bulls Ground State Forest, 31.58333°S, 152.68333°E, Feb. 2001, A. York (AM KS78241, PBI_OON 20120); 1 ♀, same data (AM KS78248, PBI_OON 20126); 2 ♂, 2 ♀, same data (AM KS78249, PBI_OON 20130); 1 ♂, 1 ♀, same data (AM KS78247, PBI_OON 20125); 1 ♀, same data (AM KS78250, PBI_OON 20129); 1 ♀, same data (AM KS78254, PBI_OON 20133); 2 ♀, same data (AM KS78255, PBI_OON 20137); 1 ♀, same data (AM KS78258, PBI_OON 20128); 1 ♂, Mount Boss State Forest, Banda Road, 1.2 km E of Hastings Forest Highway, 30.16750°S, 152.40050°E, 4 Feb.–9 Apr. 1993, M.R. Gray (AM KS42970, PBI_OON 20217).

Etymology. This species is named for Jürgen Otto for his extraordinary contributions to Australian arachnology.

Diagnosis. Males and females resemble those of *O. yorki* in having a high shouldered carapace and high abdomen with scuto-pedicle region about the diameter of the pedicle, both sharing a field of short setae at postepigastric scutum and in males the prolateral incision at the bulbal tip, but can be distinguished by the larger size, a more dense field of setae and in males a narrow bulbal tip (Figs 53H, I). In females the epigastric area in ventral view has epigastric fold (EF) with triangular posteriorly open concavity and small knob (Figs 54F, G).

Description. *Male* (PBI_OON 19282, Figs 53A–J). Total length 1.70. Prosoma, mouthparts

and abdominal scutae orange brown, legs pale orange. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes, ALE: 0.101; PME: 0.086; PLE: 0.079, ALE largest, ALE circular, PME squared; posterior eye row recurved from above, procurved from front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits. Abdomen, scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges, and additional dorsal ridge (Fig. 53G). Palpal patella 0.374 long, 0.218 wide, connection to femur at 0.48; bulb ventrally slightly bulging, tip elongated narrow with incised prolateral part (Fig. 53H, I).

Female (PBI_OON 23606, Fig. 54A-G). Total length 1.63. Eyes, ALE: 0.082; PME: 0.072; PLE: 0.059. Epigastric area, ventral view, epigastric fold (EF) with triangular posteriorly open concavity and small knob; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end (Fig. 54G); nail-like process (Na) bipartite conical; globular appendix (GAp) divided into small globular hood and narrow drop-shaped extension.

Distribution. This species is known only from north-eastern New South Wales.

Opopaea plana Baehr, sp. nov.
(Figs 55A-J, 56A-G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Girilambone Road, 5.4 km S of Monkey Bridge, 30.89200°S, 147.05533°E, 13 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77530, PBI_OON 19575). Allotype ♀: East bank of Marthaguy Ck, opposite Quilbone Bore #2 track, 30.77000°S, 147.70250°E, 24 Nov.-14 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77531, PBI_OON 19577).

Etymology. The specific name is a Latin adjective meaning flat, referring to the flat body of this species.

Diagnosis. Males and females resemble those of *O. simplex* in having a flat body and strongly reduced eyes but can be distinguished by the broader carapace, the reduced radial sternal furrows (Fig. 55B) and in males the short medially bent bulbal tip (Fig. 55 I). In females the epigastric area in ventral view with epigastric fold (EF) with long, narrow triangular median part (Fig. 56F).

Description. *Male* (PBI_OON 19575, Figs 55A-J). Total length 1.11. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace broadly oval in dorsal view, pars cephalica flat in lateral view, with rounded posterolateral corners, top smooth, sides weakly striated; lateral margin rebordered, without denticles. Eyes reduced, ALE: 0.037; PME: 0.026; PLE: 0.024, ALE largest, ALE circular, PME circular; posterior eye row straight from both above and front; ALE separated by more than their diameter, ALE-PLE separated by less than ALE radius, PME separated by less than their radius, PLE-PME separated by less than PME radius. Sternum longer than wide, with narrow and weak radial furrows between coxae I-II, II-III, III-IV, furrow smooth, surface smooth. Abdomen, scuto-pedicel region less than ½ of diameter of pedicel, with paired curved scutal ridges, connected at middle; postepigastric scutum long, semicircular, with short posteriorly directed lateral apodemes. Palpal patella 0.204 long, 0.121 wide, connection to femur at 0.51; bulb ventrally slightly bulging, with short, sharp, medially bent tip (Fig. 55 I).

Female (PBI_OON 19577, Fig. 56A-G). Total length 1.26. Eyes, ALE: 0.050; PME: 0.039; PLE: 0.038. Epigastric area, ventral view, epigastric fold (EF) with narrow triangular median part; in dorsal view paddle-like sclerite (PSc) with arms bent at the end; nail-like process (Na) conical; globular appendix (GAp) divided into small hood and long narrow extension Fig. 56G).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, 0.7 km N of turnoff to Wyndabyne Station, Warren-Quambone Road, 31.13533°S, 147.84100°E, 13 Dec. 1999, L. Wilkie *et al.* (AM KS77533, PBI_OON 19579).

Distribution. This species is known only from central New South Wales.

Opopaea simplex Baehr, sp. nov.
(Figs 57A–J, 58A–G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Castlereagh Highway, 1.7 km N of junction with Gwydir Highway, 29.89233°S, 148.15933°E, 13 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77536, PBI_OON 19580). Allotype ♀: Linton Nature Reserve, SW corner of Reserve, 60 m E of road, 30.45750°S, 150.85766°E, 18 Nov.–09 Dec. 2001, H. Doherty, M. Elliott (AM KS83430, PBI_OON 19560).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, 5.2 km W along track opp. access road to Narran Park Station, 29.70250°S, 147.28733°E, 25 Nov.–15 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77537, PBI_OON 19582); 1 ♂, Beauray State Forest, Koorelah Ra., Tucker Box Road, forest, litter, 28.47233°S, 152.40183°E, 23 Mar.–9 May 1999, S. Lassau, C. Lemann (AM KS116470, PBI_OON 23609); 1 ♂, Bulls Ground State Forest, litter, 31.55000°S, 152.63333°E, 1 Oct. 1999, A. York (AM KS102556, PBI_OON 19287); 1 ♀, Coleambally Irrigation Area, 34.92650°S, 145.77000°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS67124, PBI_OON 7542); 1 ♂, Coleambally Irrigation Area, 34.93500°S, 145.77516°E, 14 Dec. 1998, L. Wilkie, S. Priday (AM KS68920, PBI_OON 7692); 1 ♂, Copeland State Forest, 32.01666°S, 151.81666°E, 11 Feb. 1993, R. Witchard (AM KS59742, PBI_OON 20500); 1 ♂, Crown Res., 0.9 km along road to Woolomin rubbish tip, 31.30083°S, 151.15333°E, 25 Nov. 2000–15 Nov. 2001, L. Wilkie, H. Smith *et al.* (AM KS83436, PBI_OON 19564); 2 ♂, Crown Res., 8 km S of Woolomin, 31.35483°S, 151.14000°E, 15 Nov.–6 Dec. 2001, L. Wilkie, H. Smith (AM KS83559, PBI_OON 19809); 1 ♀, Crown Res., Bundarra-Cobbadah Road, 1.5 km W of Forrest Ck X, 30.22150°S, 150.70683°E, 18 Nov.–9 Dec. 2001, L. Wilkie, H. Smith (AM KS83454, PBI_OON 19783); 1 ♀, Dirrinbandi Road, 7.6 km from Collarenebri-Angledool Road jctn, 29.15866°S, 148.11716°E, 22 Nov.–12 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77535, PBI_OON 19584); 3 ♂, 2 ♀, Dowe State Forest, 30.78850°S, 150.49000°E, 23 Nov. 1999–14 Dec. 2001, L. Wilkie, H. Smith (AM KS83431, PBI_OON 19561); 1 ♂, junction of Mobigamy Creek and Carlton-Brewarinna Road, 31.10633°S, 147.18816°E, 13 Dec. 1999, L. Wilkie, R. Harris, T. Moulds (AM KS77529, PBI_OON 19581); 1 ♂, 1 ♀, Kelvin State Forest, 8 km N of Kelvin, 30.75000°S, 150.33750°E, 23 Nov. 1999–14 Dec. 2001, H. Doherty, M. Elliott (AM KS83429, PBI_OON 19558); 1 ♂, Linton Nature Reserve, 300 m from reserve entrance from Warrabah, 30.45850°S, 150.88850°E, 18 Nov.–9 Dec. 2001, H. Doherty, M. Elliott (AM KS83432, PBI_OON 19562); 2 ♂, 1 ♀, Linton Nature Reserve, 500 m past fork in road, NW side of Reserve, 30.44266°S, 150.85966°E, 18 Nov.–9

Dec. 2001, H. Doherty, M. Elliott (AM KS83428, PBI_OON 19563); 1 ♂, Linton Nature Reserve, 500 m past fork in road, NW side of Reserve, 30.44266°S, 150.85966°E, 18 Nov.–9 Dec. 2001, H. Doherty, M. Elliott (AM KS83433, PBI_OON 19565); 1 ♂, Linton Nature Reserve, 700 m W of Reserve entrance, 30.45633°S, 150.88533°E, 18 Nov.–9 Dec. 2001, H. Doherty, M. Elliott (AM KS83434, PBI_OON 19559); 1 ♂, Richmond Range State Forest, Goanna Creek Road, 0.4 km from junction with Sandy Creek Road, 28.61900°S, 152.70250°E, 4 Feb.–9 Apr. 1993, M.R. Gray (AM KS37796, PBI_OON 7973); 1 ♂, Spirabo State Forest, Wattle Creek Road, 29.30633°S, 152.17483°E, 4 Feb.–9 Apr. 1993, M.R. Gray (AM KS38196, PBI_OON 7962).

Etymology. The specific name is a Latin adjective *simplex* meaning simple, referring to the fact that this species has no special body features.

Diagnosis. Males and females resemble those of *O. plana* in having a flat body and strongly reduced eyes but can be distinguished by the longer carapace and in males the long medially bent bulbal tip (Fig. 57 I). In females the epigastric area in ventral view has epigastric fold (EF) with concavity occupying half of its width and with small inverted drop-shaped knob (Fig. 58G).

Description. *Male* (PBI_OON 19580, Figs 57A–J). Total length 1.29. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, top smooth, sides only slightly striated; lateral margin rebordered, without denticles. Eyes reduced, tiny, ALE: 0.044; PME: 0.036; PLE: 0.029, ALE largest, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide, flat, with radial furrows between coxae I–II, II–III, III–IV, surface smooth. Abdomen, scuto-pedicel region less than ½ of diameter of pedicel, with paired curved scutal ridges, connected at middle (Fig. 57G). Palpal patella 0.233 long, 0.129 wide, connection to femur at 0.46; bulb ventrally strongly bulging, tip long nail-shaped, bent medially.

Female (PBI_OON 19560, Fig. 58A–G). Total length 1.41. Eyes, ALE: 0.040; PME: 0.045; PLE: 0.039. Epigastric area, ventral view, epigastric fold (EF) with concavity occupying half of its width, with small inverted-dropshaped knob; in dorsal view paddle-like sclerite (PSc) with slightly bowed arms; nail-like process (Na) conical; globular appendix (GA) divided into tiny hood and long inverted t-shaped extension (Fig. 58G).

Distribution. This species is widely distributed in New South Wales.

Opopaea sown Baehr, 2011

(Figs 59A–F)

Opopaea sown Baehr, 2011: 432–433, figs 6, 32–34, 50, 51, 63.

Material examined. See Baehr (2011).

New material examined. AUSTRALIA: *New South Wales*: 1 ♂, 1 ♀, Bulls Ground State Forest, litter, 31.55000°S, 152.63333°E, 1 Oct. 1999, A. York (AM KS102607, PBI_OON 19224); 1 ♂, same data (AM KS102609, PBI_OON 19237); 1 ♂, same data (AM KS102590, PBI_OON 19241); 1 ♂, 1 ♀, same data (AM KS102583, PBI_OON 19244); 1 ♂, same data (AM KS102575, PBI_OON 19246); 1 ♂, same data (AM KS102578, PBI_OON 19251); 1 ♀, same data (AM KS102598, PBI_OON 19255); 1 ♂, 1 ♀, same data (AM KS102589, PBI_OON 19258); 1 ♀, same data (AM KS102595, PBI_OON 19262); 1 ♂, same data (AM KS102580, PBI_OON 19271); 1 ♀, same data (AM KS102561, PBI_OON 19279); 2 ♂, same data (AM KS102555, PBI_OON 19286); 1 ♀, same data (AM KS102555, PBI_OON 19286); 1 ♂, same data (AM KS102535, PBI_OON 19290); 1 ♀, same data (AM KS102534, PBI_OON 19292); 1 ♀, same data (AM KS102536, PBI_OON 19294); 1 ♀, same data (AM KS102521, PBI_OON 19296); 1 ♂, 1 ♀, same data (AM KS102531, PBI_OON 19299); 1 ♂, same data (AM KS102520, PBI_OON 19303); 1 ♂, same data (AM KS102538, PBI_OON 19307); 1 ♂, same data (AM KS102519, PBI_OON 19307); 2 ♀, same data (AM KS102547, PBI_OON 19309); 1 ♂, same data (AM KS102537, PBI_OON 19310); 1 ♀, same data (AM KS102544, PBI_OON 19311); 1 ♀, same data (AM KS102544, PBI_OON 19311); 1 ♀, same data (AM KS102541, PBI_OON 19316); 2 ♀, same data (AM KS102529, PBI_OON 19319); 2 ♀, same data (AM KS102623, PBI_OON 23539); 1 ♀, same data (AM KS102532, PBI_OON 23541); 1 ♀, same data (AM KS102600, PBI_OON 23546); 1 ♂, same data (AM KS102616, PBI_OON 23548); 1 ♀, same data except 1 Feb. 2001 (AM KS102601, PBI_OON 19226); 1 ♀, same data (AM KS102611, PBI_OON 19232); 1 ♀, same data (AM KS102618, PBI_OON 19240); 1 ♂, same data (AM

KS102596, PBI_OON 19261); 1 ♂, same data (AM KS102565, PBI_OON 19274); 1 ♂, 1 ♀, same data (AM KS102543, PBI_OON 19317); 1 ♂, same data (AM KS102530, PBI_OON 19320); 1 ♂, same data (AM KS102579, PBI_OON 23530); 1 ♂, same data except 1 Apr. 2000, (AM KS102615, PBI_OON 19229); 1 ♂, same data (AM KS102519, PBI_OON 19306); 1 ♂, same data (AM KS102614, PBI_OON 19238); 1 ♀, same data (AM KS102577, PBI_OON 19245); 4 ♂, 1 ♀, same data (AM KS102572, PBI_OON 19265); 1 ♂, same data (AM KS102519, PBI_OON 19308); 2 ♂, same data except 1 Mar. 1996 (AM KS102582, PBI_OON 19247); 1 ♂, same data (AM KS102551, PBI_OON 19313); 1 ♂, same data (AM KS102648, PBI_OON 23545); 1 ♂, 1 ♀, same data (AM KS102574, PBI_OON 19250); 1 ♀, same data (AM KS102525, PBI_OON 19297); 1 ♂, same data (AM KS102589, PBI_OON 19258); 1 ♂, 1 ♀, same data (AM KS102569, PBI_OON 19259); 1 ♂, 1 ♀, same data (AM KS102573, PBI_OON 19266); 1 ♂, Lumeah Road, 1.7 km from Mt Allyn Road, Chichester State Forest, 32.10533°S, 151.43400°E, 4 Feb.–9 Apr. 1993, M. Gray, G. Cassis (AM KS38930, PBI_OON 7986); 1 ♂, Mt Boss State Forest Rimau Road, 31.19133°S, 152.35450°E, 4 Feb.–9 Apr. 1993, M. Gray, G. Cassis (AM KS43091, PBI_OON 20209); 3 ♂, Riamukka State Forest, 31.35416°S, 151.60833°E, Jan. 1993, I. Oliver (AM KS89995, PBI_OON 20159).

Diagnosis. Males resemble those of *O. suelewisae* in having a relatively flat body, carapace top smooth, sides striated and with thin medially bent palpal tip but can be distinguished by the broader carapace (Fig. 59A), the ‘fenestra’ with a broad fold and the longer and broader tip (Fig. 59F).

Description. *Male*: See Baehr (2011).

Female. See Baehr (2011).

Distribution. This species is known only from north-eastern New South Wales and south-eastern Queensland.

Opopaea sturt Baehr, sp. nov.

(Figs 60A–J)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Sturt National Park, 29.27600°S, 142.15316°E, 25 Sept. 1997, A. Pik (AM KS79407, PBI_OON 20189).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. bushblitz* in having a flat body, with scuto-pedicel region only ½ of diameter of pedicel and paired scutal

ridges slightly arched, connected medially but can be distinguished by the lack of a short medially striated tip (Fig. 60 I).

Description. *Male* (PBI_OON20189, Figs 60A–J). Total length 1.53. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow, palpal patella orange brown. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes, ALE: 0.075, PME: 0.060; PLE: 0.048, ALE largest, ALE circular, PME oval; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow smooth, surface smooth. Abdomen, scuto-pedicle region $\frac{1}{2}$ of diameter of pedicle, with paired curved scutal ridges. Palpal patella 0.246 long, 0.141 wide, connection to femur 0.52; palpal bulb ventrally strongly bulging with wide ‘fenestra’ and short medially bent tip (Fig. 60 I).

Female. Unknown.

Distribution. This species is known only from north-western New South Wales.

Opopaea suelewisae Baehr & Smith, sp. nov.
(Figs 61A–J, 62A–G)

Material examined. Holotype ♂: **AUSTRALIA: New South Wales:** E side of Bald Hill (Tamworth), 31.07150°S, 150.95600°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS83565, PBI_OON 19804). Allotype ♀: 2 km from Tamworth on Tintinhull Road, 31.05566°S, 150.95083°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS83554, PBI_OON 19790).

Other material examined. **AUSTRALIA: New South Wales:** 2 ♀, ‘Temi’ (N of Murrurundi), Chilcotts Ck Road, 31.67466°S, 150.81666°E, 15 Nov.–6 Dec. 2001, L. Wilkie, H. Smith (AM KS83580, PBI_OON 19685); 1 ♂, 1 ♀, same data (AM KS83552, PBI_OON 19798); 1 ♂, 20 km N of Burcher on Road to Manna Mtn, 33.36866°S, 147.25033°E, 25 Mar. 1996, D. Smith R. Harris (AM KS49556, PBI_OON 20549); 1 ♀, 2 km from Tamworth on Tintinhull Road, 31.05566°S, 150.95083°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS83583, PBI_OON 19677); 1 ♂, same

data (AM KS83440, PBI_OON 19768); 1 ♂, same data (AM KS83441, PBI_OON 19779); 1 ♂, same data (AM KS83554, PBI_OON 19790); 1 ♂, 2 ♀, same data (AM KS83550, PBI_OON 19800); 4 ♂, same data (AM KS83557, PBI_OON 19802); 2 ♂, 1 ♀, same data (AM KS83548, PBI_OON 19805); 7.5 km NW of Gin Gin, Wambianna Station, 31.87116°S, 148.02266°E, 22 Nov.–12 Dec. 1999, L. Wilkie *et al.*, 1 ♂ (AM KS77582, PBI_OON 19066); 1 ♀, Crown Res., 8 km S of Woolomin, 31.35483°S, 151.14000°E, 15 Nov.–6 Dec. 2001, L. Wilkie, H. Smith (AM KS83581, PBI_OON 19679); 1 ♂, Doubleduke State Forest, 2 km WSW of jctn of Pacific Highway and Glencoe Road, 29.20816°S, 153.24083°E, 4 Feb.–9 Apr. 1993, M. Gray, G. Cassis (AM KS42156, PBI_OON 20215); 1 ♂, Dowse State Forest, 30.78850°S, 150.49000°E, 23 Nov. 1999–14 Dec. 2001, L. Wilkie, H. Smith (AM KS83567, PBI_OON 19797); 2 ♂, E side of Bald Hill (Tamworth), 31.07150°S, 150.95600°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS119748, PBI_OON 23551); 1 ♂, Middle of Attunga State Forest, end of Archery Trail, 30.92583°S, 150.92000°E, 16 Nov.–7 Dec. 2001, G. Carter (AM KS83446, PBI_OON 19780); 1 ♂, Mororo State Forest, litter, 29.31766°S, 153.23800°E, 1 Feb. 1997, A. York (AM KS102691, PBI_OON 19399); 1 ♂, Mountain Trail, 0.8 km S of jctn with Kunungra Road, 32.13866°S, 151.75050°E, 4 Feb.–9 Apr. 1993, M. Gray, G. Cassis (AM KS40572, PBI_OON 7959); 1 ♀, Mt Kaputar National Park, 250 m S of track to car park at Waa Gorge, 30.05983°S, 150.08816°E, 21 Nov.–12 Dec. 2001, H. Doherty, H. Smith (AM KS83453, PBI_OON 19777); 1 ♀, Mt Kaputar National Park, Bullawa Ck Tk, 1.1 km past Foggy Dell turnoff, 30.23583°S, 150.08716°E, 20 Nov.–11 Dec. 2001, L. Wilkie, H. Smith (AM KS83573, PBI_OON 19686); 1 ♂, Nana Creek State Forest, 5 km ENE of Lowanna, 30.19183°S, 152.94216°E, 10–23 Nov. 1999, M. Gray, G. Milledge, H. Smith (AM KS63397, PBI_OON 20559); 2 ♀, Oaky Creek Nature Reserve, in valley in line with most northerly peak to the west, 31.08766°S, 150.60583°E, 16 Nov.–8 Dec. 2001, H. Doherty, M. Elliott (AM KS83574, PBI_OON 19678); 1 ♂, same data (AM KS83569, PBI_OON 19795); 1 ♂, 1 ♀, same data (AM KS83555, PBI_OON 19796); 1 ♀, Oaky Creek Nature Reserve, up tributary on W range; ridge on footslopes of NE side of Figtree Mt, 31.10183°S, 150.60700°E, 17 Nov.–8 Dec. 2001, L. Wilkie (AM KS83577, PBI_OON 19684); 1 ♀, Oaky Creek Nature Reserve, 31.10633°S, 150.61850°E, 17 Nov.–8 Dec. 2001, L. Wilkie, H. Smith (AM KS83582, PBI_OON 19674); 1 ♂, same data (AM KS83570, PBI_OON 19789); 1 ♀, Oaky Creek Nature Reserve, 400 m W of Oaky Ck Road, 31.10916°S, 150.60966°E, 17 Nov.–8 Dec. 2001, H. Doherty, M. Elliott (AM KS83572, PBI_OON 19673); 1 ♀, same data (AM KS83578, PBI_OON 19682); 1 ♂, same data (AM KS83568, PBI_OON 19794); 1 ♂, Oaky Creek Nature Reserve, at base of E side of Melville Range, 31.10516°S, 150.62000°E, 17 Nov.–8 Dec. 2001, L. Wilkie, H. Smith (AM KS83566, PBI_OON 19792); 2 ♂, same data (AM KS83564, PBI_OON 19793); 2

♂, 1 ♀, same data (AM KS83549, PBI_OON 19801); 3 ♂, same data (AM KS83556, PBI_OON 19803); 2 ♂, same data (AM KS83560, PBI_OON 19810); 1 ♀, Oaky Creek Nature Reserve, W bank of Oaky Creek, 30.20100°S, 150.63583°E, 16 Nov.–8 Dec. 2001, L. Wilkie, H. Smith (AM KS83584, PBI_OON 19681); 1 ♂, 2 ♀, same data (AM KS83551, PBI_OON 19799); 1 ♂, Pilliga region, 'Baraba', 30.10900°S, 148.78733°E, 1 Feb. 2001, I. Oliver (AM KS81026, PBI_OON 20191); 1 ♀, Pilliga region, 'Valmyma', 30.48500°S, 148.81800°E, Febr. 2001, I. Oliver (AM KS81025, PBI_OON 20205); 1 ♀, Sturt National Park, 29.10783°S, 141.60483°E, 26 Sept. 1997, M. Streulens (AM KS83162, PBI_OON 7735); 1 ♀, Sturt National Park, 29.01983°S, 141.17633°E, 28 Sept. 1997, M. Gillings (AM KS83773, PBI_OON 7738); 1 ♀, Sturt National Park, 29.10783°S, 141.60483°E, 26 Sept. 1997, M. Streulens (AM KS83160, PBI_OON 7739); 1 ♀, Sturt National Park, 29.27600°S, 142.15316°E, 25 Sept. 1997, A. Holmes (AM KS79470, PBI_OON 7741); 1 ♀, Tamworth, W side of Bald Hill behind radio tower, 31.07216°S, 150.95400°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS83576, PBI_OON 19680); 2 ♂, same data (AM KS83558, PBI_OON 19788); 1 ♀, W of Flagstaff Mtn (Tamworth), 31.08566°S, 150.97166°E, 15 Nov.–6 Dec. 2001, H. Doherty, M. Elliott (AM KS83571, PBI_OON 19787); 1 ♂, 1 ♀, same data (AM KS83553, PBI_OON 19791); 1 ♂, same data (AM KS83562, PBI_OON 19806).

Etymology. The specific name is in honour of Sue Lewis, for her contribution to educating children about spiders.

Diagnosis. Males resemble those of *O. milledgei* in having a flat body, carapace top smooth, sides striated and with thin medially bent palpal tip but can be distinguished by the much smaller eyes, endites 1 ½ times as long as wide with strong tooth-like projection at anteriomedian part and the slightly shorter tip (Fig. 61F). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) with strongly bent arms (Fig. 62G).

Description. *Male* (PBI_OON 19804, Figs 61A–J). Total length 1.32. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes small, ALE: 0.044; PME: 0.044; PLE: 0.040, ALE, PME subequal, larger than PLE, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE separated by

less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, slightly bulging between coxae IV, setae orientated in circle. Abdomen, scuto-pedicle region less than diameter of pedicle, with paired curved scutal ridges. Palpal patella 0.239 long, 0.143 wide, connected to femur at 0.47; bulb ventrally strongly bulging with thin, spatulate medially bent tip (Fig. 61I).

Female (PBI_OON 19790, Figs 62A–G). Total length 1.48. Eyes, ALE: 0.049; PME: 0.038; PLE: 0.034. Epigastric area, ventral view, epigastric fold (EF) widely triangular, with small knob; in dorsal view paddle-like sclerite (PSc) with strongly bent arms; nail-like process (Na) narrow conical; globular appendix (GAp) divided into tiny hood and triangular extension (Fig. 62G).

Distribution. This species is widely distributed in New South Wales.

Opopaea sylvestrella Baehr & Smith, sp. nov.
(Figs 63A–J, 64A–G)

Material examined. Holotype ♂: AUSTRALIA: New South Wales: Lord Howe Island, Malabar Hill walking track, 31.50850°S, 159.05450°E, 10 Aug. 2001, I. Hutton (AM KS88937, PBI_OON 20285). Allotype ♀: collected with holotype (AM KS88937, PBI_OON 23550).

Other material examined. AUSTRALIA: New South Wales: Lord Howe Island: 1 ♀, Erskine Valley, 31.58000°S, 159.07666°E, 175 m, 12 July 1979, T. Kingston, B. Miller (AM KS10518, PBI_OON 20529); 1 ♀, "Seabreeze", 31.55116°S, 159.07200°E, 12 Feb. 1979, T.J. Kingston (AM KS88934, PBI_OON 20277); 1 ♂, base of Round Face (Mt. Lidgbird), Far Flats, 31.56816°S, 159.07250°E, 4–14 Dec. 2000 (AM KS76129, PBI_OON 20450); 1 ♂, beach at Old Gulch on W footslopes, 31.50883°S, 159.03933°E, 20 Nov. 2000 (AM KS75762, PBI_OON 20114); 1 ♂, same data (AM KS75888, PBI_OON 20451); 1 ♂, below Intermediate Hill, Boat Harbour trail, 31.54316°S, 159.08733°E, 12 Dec. 2000 (AM KS79114, PBI_OON 20100); 1 ♂, Boat Harbour Trail, 100 m S of Rocky Run Ck, 31.55333°S, 159.08816°E, 12 Dec. 2000, G.A. Cassis (AM KS79124, PBI_OON 20444); 1 ♀, coast trail to Boat Harbour, 750 m from start, 31.54183°S, 159.08500°E, 3–13 Dec. 2000 (AM KS76093, PBI_OON 20106); 1 ♂, same data (AM KS76098, PBI_OON 20117); 1 ♀, E end of Boat Harbour Beach, 31.55616°S, 159.09216°E, 26 Nov.–2 Dec. 2000 (AM KS76109, PBI_

- OON 20103); 1 ♂, 1 ♀, same data (AM KS75814, PBI_OON 20111); 1 ♂, E slope of Malabar Ridge, above Neds Beach, 31.51716°S, 159.05633°E, 25 Nov.–2 Dec. 2000 (AM KS75921, PBI_OON 20113); 1 ♂, same data (AM KS75920, PBI_OON 20458); 1 ♀, E slope of Phillip Point (North Head), 31.52000°S, 159.03816°E, 1 Dec. 2000 (AM KS75776, PBI_OON 20115); 1 ♀, Get Up Place, trail to Mt Gower, 31.57466°S, 159.07533°E, 2 Dec. 2000 (AM KS75843, PBI_OON 20442); 1 ♂, same data (AM KS76206, PBI_OON 20448); 1 ♂, Intermediate Hill Tk, Rocky Run crossing, 31.55366°S, 159.08566°E, 18 May 2002, I. Hutton (AM KS88935, PBI_OON 20281); 1 ♂, same data except 24 Jan. 1979, T. Kingston, B. Miller (AM KS102508, PBI_OON 20523); 1 ♀, Malabar Hill walking track, half way to summit, 31.51666°S, 159.05683°E, 10 Aug. 2001, I. Hutton (AM KS88927, PBI_OON 20280); 1 ♂, same data (AM KS88938, PBI_OON 20273); 1 ♀, Malabar Hill, on path to Kim's Lookout, 31.50900°S, 159.05366°E, 24 Nov. 2000 (AM KS79115, PBI_OON 20099); 1 ♀, same data (AM KS75870, PBI_OON 20101); 1 ♂, Mt Gower summit, 31.58716°S, 159.06983°E, 1978, T.J. Kingston (AM KS87116, PBI_OON 20455); 1 ♂, Mt Lidgbird, 31.55866°S, 159.08633°E, 31 Jan. 1980, T.J. Kingston (AM KS88930, PBI_OON 20283); 1 ♂, N bank of Rocky Run Ck, Boat Harbour Trail, 31.55316°S, 159.08883°W, 26 Nov.–3 Dec. 2000 (AM KS79122, PBI_OON 20446); 1 ♀, same data (AM KS79121, PBI_OON 20447); 1 ♂, same data except 3–13 Dec. 2000 (AM KS76050, PBI_OON 20449); 1 ♀, same data (AM KS79120, PBI_OON 20462); 1 ♀, North Hummock, trail to Intermediate Hill, 31.54233°S, 159.07633°E, 26 Nov.–3 Dec. 2000 (AM KS79116, PBI_OON 20112); 1 ♂, same data (AM KS79117, PBI_OON 20116); 1 ♀, same data (AM KS75974, PBI_OON 20441); 1 ♂, same data (AM KS79118, PBI_OON 20443); 2 ♂, 2 ♀, NW slope of Malabar Hill, 31.51800°S, 159.05700°E, 7 Aug. 2001, I. Hutton (AM KS88928, PBI_OON 20286); 1 ♀, Old Settlement, 31.51900°S, 159.05083°E, 1979, T.J. Kingston (AM KS88932, PBI_OON 20274); 2 ♀, Old Settlement, 31.51900°S, 159.05083°E, 1979, T.J. Kingston (AM KS88931, PBI_OON 20278); 1 ♂, Peach Tree Ridge, below Intermediate Hill, 31.55016°S, 159.08416°E, 3 Dec. 2000 (AM KS75800, PBI_OON 20459); 1 ♀, same data (AM KS79119, PBI_OON 20461); 1 ♂, S end of Salmon Beach, 31.56800°S, 159.07133°E, 4–14 Dec. 2000 (AM KS76116, PBI_OON 20102); 1 ♀, Stevens Reserve, New Settlement, 31.52233°S, 159.05900°E, 30 Sept. 1978, T. Kingston, B. Miller (AM KS87112, PBI_OON 20454); 1 ♀, same data except 25 Sept. 1978 (AM KS87113, PBI_OON 20456); 1 ♂, same data except 23 Sept. 1978 (AM KS88933, PBI_OON 20263); 1 ♂, Stevens Reserve, 31.52083°S, 159.06766°E, 8–12 Dec. 2000, H. Gibb, R. Harris, T. Moulds (AM KS82454, PBI_OON 20445); 1 ♀, Stevens Reserve, 31.52233°S, 159.05900°E, 11 July 1979, T. Kingston, B. Miller (AM KS102511, PBI_OON 20522); 1 ♂, 1 ♀ Stevens Reserve, 31.52083°S, 159.06766°E, 13 Nov. 1979, G. Monteith (QM S79699, PBI_OON 22480); 1 ♀, Stevens Reserve, disturbance gradients, 31.52083°S, 159.06766°E, 8–15 Dec. 2000, H. Gibb, R. Harris, T. Moulds (AM KS88929, PBI_OON 20287); 1 ♀, trail through Erskine Valley, 31.57283°S, 159.07216°E, 25 Nov.–2 Dec. 2000 (AM KS76174, PBI_OON 20460); 1 ♀, trail to Boat Harbour, opp. Mutton Bird Pt, 31.54283°S, 159.08733°E, 26 Nov.–3 Dec. 2000 (AM KS75984, PBI_OON 20107); 1 ♀, trail to Mt Gower, 31.58533°S, 159.07250°E, 5–14 Dec. 2000 (AM KS79123, PBI_OON 20452); 1 ♂, Transit Hill (Nicholls), 31.53416°S, 159.07050°E, 25 Oct. 1978, T. Kingston, B. Miller (AM KS87111, PBI_OON 20110); 1 ♂, same data except 10 Oct. 1978 (AM KS87114, PBI_OON 20453); 1 ♂, 1 ♀, same data (AM KS87115, PBI_OON 20457); 1 ♀, W slope of Malabar Ridge, 31.50950°S, 159.05516°E, 24 Nov. 2000 (AM KS75763, PBI_OON 20109); 1 ♂, W slope of Transit Hill, 31.53416°S, 159.03733°E, 24 Nov. 1999–1 Dec. 2000 (AM KS75946, PBI_OON 20118); 1 ♀, walking trail through Erskine Valley, 31.57283°S, 159.07216°E, 2 Dec. 2000 (AM KS75832, PBI_OON 20105); 1 ♀, same data except 31.50000°S, 159.06666°E, 1 Jan. 1979, T. Kingston (AM KS102513, PBI_OON 20526); 1 ♂, 1 ♀, Mount Gower west side, 31.58333°S, 159.06666°E, 22 Nov. 1978, T. Kingston, B. Miller (AM KS102517, PBI_OON 20528); 1 ♀, 100 m east of Soldiers Creek, closer to trail, 31.57583°S, 159.08483°E, 12 Dec. 2003, G. Brown (AM KS90329, PBI_OON 20270); 1 ♀, Erskine Valley, 31.58000°S, 159.06666°E, 12 July 1979, T. Kingston, B. Miller (AM KS102505, PBI_OON 20521); 1 ♀, same data except 1 Aug. 1979 (AM KS102516, PBI_OON 20530); 1 ♀, golf course, near second tee, 31.55183°S, 159.08350°E, 28 May–7 June 2003, I. Hutton (AM KS90465, PBI_OON 20264); 1 ♀, same data (AM KS90588, PBI_OON 20265); 1 ♂, same data except 12 Dec. 2003, G. Brown (AM KS90328, PBI_OON 20267); 1 ♀, same data (AM KS90326, PBI_OON 20275); 1 ♀, next to Golf Course, walking track to 3rd tee, 31.55183°S, 159.08350°E, 3 June 2003, I. Hutton (AM KS90590, PBI_OON 20279); 1 ♂, next to Soldiers Creek, first sites reached, 31.57583°S, 159.08483°E, 8 June 2003, I. Hutton (AM KS90589, PBI_OON 20276); 1 ♂, same data except 6 Dec. 2003, G. Brown (AM KS90323, PBI_OON 20282); 1 ♂, North Hummock (trail to Intermediate Hill), 31.54233°S, 159.07466°E, 3 Dec. 2000 (AM KS75792, PBI_OON 20108); 1 ♂, on Soldiers Creek at northwest junction, 31.57583°S, 159.08483°E, 29 May–8 June 2003, I. Hutton (AM KS90464, PBI_OON 20271); 1 ♂, 1 ♀, Stevens Reserve, 31.52233°S, 159.05900°E, 30 Sept. 1978, T. Kingston, B. Miller (AM KS102506, PBI_OON 20527); 1 ♀, western edge of golf course, left side of clearing, 31.55183°S, 159.08350°E, 6 Dec. 2003, G. Brown (AM KS90327, PBI_OON 20268); 1 ♂, same data (AM KS90325, PBI_OON 20272); 1 ♂, same data (AM KS90324, PBI_OON 20284); 1 ♂, Western slope of Malabar Ridge, S of Kims Lookout trail, 31.50950°S, 159.05516°E, 24 Nov. 1999–1 Dec. 2000 (AM KS75895, PBI_OON 20104); 1 ♀, North Bay, 31.52000°S, 159.03333°E, 15 Nov. 1978, T. Kingston, B. Miller (AM KS102509, PBI_OON 20524); 1 ♂, Roach Island, 31.50000°S, 159.06666°E, Dec. 2002, G.A. Cassis (AM KS90991, PBI_OON 19140).

Etymology. This species is named in the diminutive form of the Latin *sylvestris*, in reference to the Lord Howe Island Woodhen (*Gallirallus sylvestris*). Many specimens of this *Opopaea* species were captured during surveys for the 'Woodhen project' to save this endangered bird.

Diagnosis. Males and females resemble those of *O. yorki* in having scuto-pediceal region about diameter of pedicel, with additional median ridge, and in males, bulb slightly bulging, tip slightly curved medially, with prolateral incision, but can be recognised by carapace only slightly elevated, and elongated abdomen (Fig. 63A, E).

Description. *Male* (PBI_OON 20285, Figs 63A–J). Total length 1.86. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs orange. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes large, ALE: 0.086; PME: 0.080; PLE: 0.069, ALE largest, ALE circular, PME squared; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow smooth, surface smooth. Abdomen, scuto-pediceal region about diameter of pedicel, with paired nearly straight scutal ridges and additional short scutal ridge. Palpal patella 0.298 long, 0.173 wide, connection to femur 0.49; bulb strongly bulging, 'fenestra' with a lateral fold ending in short, spatulate, medially bent tip (Fig. 63 I).

Female (PBI_OON 23550, Fig. 64A–G). Total length 2.12. Eyes, ALE: 0.086; PME: 0.069; PLE: 0.074. Epigastric area, ventral view, epigastric fold (EF) widely bowed, with tiny median knob; in dorsal view paddle-like sclerite (PSc) with arms bent at the end; nail-like process (Na) small, conical; globular appendix (GAP) funnel-shaped (Fig. 64G).

Distribution. This species is known only from Lord Howe Island, New South Wales.

Opopaea tenuis Baehr, sp. nov.
(Figs 65A–J, 66A–G)

Material examined. Holotype ♂: AUSTRALIA: New South Wales: Castlereagh Highway, 1.7 km N of junction with Gwydir Highway, 29.89233°S, 148.15933°E, 13 Dec. 1999; F. Christie, P. Flemons, M. Elliott (AM KS77545, PBI_OON 07902). Allotype ♀: 150 m N of bridge over Gingham Watercourse S of Weemelah, 29.22166°S, 149.26733°E, 26 Nov.–16 Dec. 1999, L. Wilkie *et al.* (AM KS77540, PBI_OON 07903).

Other material examined. AUSTRALIA: New South Wales: 4 ♂, 150 m N of bridge over Gingham Watercourse S of Weemelah, 29.22166°S, 149.26733°E, 26 Nov.–16 Dec. 1999, L. Wilkie *et al.* (AM KS77540, PBI_OON 7903); 1 ♂, Narran Plains Road, 3.8 km N of Narran Lake Road jct, forest, litter, 29.68900°S, 147.33350°E, 25 Nov.–15 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77546, PBI_OON 7901); 1 ♂, Parkdale Station, S of access track to Maynes Lagoon, 28.66716°S, 150.32633°E, 29 Nov.–19 Dec. 1999, L. Wilkie *et al.* (AM KS77544, PBI_OON 7904).

Etymology. The specific name is a Latin adjective, *tenuis*, meaning thin, fine, delicate referring to the delicate body shape of this species.

Diagnosis. Males and females resemble those of *O. suelewisae* in having a flat body with scuto-pediceal region less than a diameter of pedicel but can be distinguished by the protruding epigastric scutum, the long posteriorly directed lateral apodemes, 2/3 as long as postepigastric scutum (Fig. 65C). Males similarly have a strongly bulging bulb but have a prolaterally incised, short medially bent bulbal tip (Fig. 65 I). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) with straight arms only bent at the end (Fig. 66G).

Description. *Male* (PBI_OON 07902, Figs 65A–J). Total length 1.44. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes reduced, ALE: 0.059; PME: 0.058; PLE: 0.044, ALE largest, ALE circular, PME oval; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows

between coxae I-II, II-III, III-IV, furrows with small pits. Abdomen, scuto-pediceal region less than diameter of pedicel with paired curved scutal ridges; epigastric scutum, protruding (Fig. 65E); postepigastric scutum with long posteriorly directed lateral apodemes, about 2/3 as long as postepigastric scutum (Fig. 65C). Palpal patella 0.180 long, 0.110 wide, connection to femur at 0.44; bulb ventrally strongly bulging, with prolaterally incised, short medially bent tip (Fig. 65 I).

Female (PBI_OON 07903, Fig. 66A-G). Total length 1.62. Eyes, ALE: 0.062; PME: 0.056; PLE: 0.058. Epigastric area, ventral view, epigastric fold (EF) widely bowed, with tiny knob and small median concavity; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end (Fig. 66G); nail-like process (Na) cylindrical; globular appendix (GAp) connected with chitinized area.

Distribution. This species is known only from the Northern border of New South Wales.

Opopaea ursulae Baehr, sp. nov.
(Figs 67A-J)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: 0.7 km N of turnoff to Wyndabyne Station, Warren-Quambone Road, 31.13533°S, 147.84100°E, 13 Dec. 1999, L. Wilkie *et al.* (AM KS77497, PBI_OON 20184).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♂, 14.6 km along track to 'New Chum' from hwy jcnctn, 'Trilby', 30.53766°S, 144.80900°E, 1-21 Dec. 1999, F. Christie, P. Flemons, M. Elliott (AM KS77503, PBI_OON 20183).

Etymology. The specific name is for Ursula Baehr the daughter of the senior author who has helped collecting and databasing Goblin Spiders.

Diagnosis. Males resemble those of *O. suelewisae* in having a flat body with scuto-pediceal region less than the diameter of the pedicel but can be distinguished by fangs with a prolateral row of rough teeth, retrolaterally serrated (Fig. 67H), and a bulbal tip with prolateral ribbed ridge (Fig. 67J).

Description. *Male* (PBI_OON 20184, Figs 67A-J). Total length 1.21. Prosoma, mouthparts, abdominal scutae and legs pale orange. Carapace ovoid in dorsal view, pars cephalica

slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.059; PME: 0.062; PIE: 0.061, PME largest, ALE oval, PME oval; posterior eye row procurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum flat, as long as wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits. Abdomen, scuto-pediceal region 1/2 of diameter of pedicel, with paired curved scutal ridges (Fig. 67G). Palpal patella 0.232 long, 0.134 wide, connection to femur at 0.46; bulb ventrally strongly bulging, 'fenestra' with short medially bent fold, prolateral tip with narrow ribbed ridge (Figs 67I, J).

Female. Unknown.

Distribution. This species is known only from central New South Wales.

Opopaea yorki Baehr, sp. nov.
(Figs 68A-J, 69A-G)

Material examined. Holotype ♂: AUSTRALIA: *New South Wales*: Bulls Ground State Forest, litter, 31.55000°S, 152.63333°E, 1 Oct. 1999, A. York (AM KS102563, PBI_OON 19273). Allotype ♀: collected with holotype (AM KS102548, PBI_OON 19318).

Other material examined. AUSTRALIA: *New South Wales*: 1 ♀, Beecroft Reserve, 33.75000°S, 151.06666°E, 3 June 2001, J. Noble (AM KS72869, PBI_OON 20363); 1 ♂, same data (AM KS72870, PBI_OON 20368); 1 ♀, Bulls Ground State Forest, litter, 31.55000°S, 152.63333°E, 1 Oct. 1999, A. York (AM KS102608, PBI_OON 19223); 1 ♀, same data (AM KS102559, PBI_OON 19277); 2 ♀, same data (AM KS102554, PBI_OON 19280); 5 ♂, 3 ♀, same data (AM KS102564, PBI_OON 19284); 1 ♀, same data (AM KS102562, PBI_OON 19285); 1 ♀, same data (AM KS102566, PBI_OON 19288); 3 ♀, same data (AM KS102558, PBI_OON 19289); 4 ♀ (AM KS102522, PBI_OON 19293); 2 ♂, same data (AM KS102522, PBI_OON 19293); 1 ♀, same data (AM KS102527, PBI_OON 19300); 1 ♀, same data (AM KS102528, PBI_OON 19301); 1 ♀, same data (AM KS102549, PBI_OON 19302); 1 ♂, 1 ♀, same data (AM KS102545, PBI_OON 19314); 1 ♂, same data (AM KS102542, PBI_OON 19315); 2 ♂, 3 ♀, same data (AM KS102548, PBI_OON 19318); 1 ♀, same data (AM KS102623, PBI_OON 19342); 1 ♂, 1 ♀, same data (AM KS102588, PBI_OON 23531); 2 ♀, same data (AM KS102607, PBI_OON 23534); 1 ♂,

same data (AM KS102547, PBI_OON 23540); 1 ♂, same data (AM KS102544, PBI_OON 23542); 1 ♂, same data (AM KS102531, PBI_OON 23543); 1 ♀, same data (AM KS102589, PBI_OON 23547); 1 ♂, 4 ♀, same data (AM KS102600, PBI_OON 19257); 1 ♂, 1 ♀, same data (AM KS102591, PBI_OON 19270); 1 ♂, same data (AM KS102597, PBI_OON 19267); 1 ♂, 1 ♀, same data (AM KS102587, PBI_OON 19269); 1 ♂, 1 ♀, same data (AM KS102586, PBI_OON 19272); 1 ♂, 1 ♀, same data (AM KS102599, PBI_OON 19264); 1 ♀, same data (AM KS102584, PBI_OON 19254); 1 ♂, same data (AM KS102606, PBI_OON 19234); 1 ♂, 1 ♀, same data (AM KS102576, PBI_OON 19268); 1 ♂, 2 ♀, same data (AM KS102616, PBI_OON 19239); 1 ♀, same data (AM KS102670, PBI_OON 19248); 1 Feb. 2001, 1 ♀ (AM KS102579, PBI_OON 19252); 1 ♀, same data (AM KS102553, PBI_OON 19278); 1 ♀, same data (AM KS102619, PBI_OON 19344); 1 ♀, same data (AM KS102621, PBI_OON 19341); 1 ♀, same data (AM KS102649, PBI_OON 19338); 1 ♀, same data (AM KS102622, PBI_OON 19346); 2 ♀, same data (AM KS102571, PBI_OON 19249); 1 ♀, same data (AM KS102605, PBI_OON 19225); 1 ♀, same data (AM KS102603, PBI_OON 19228); 1 ♀, same data (AM KS102610, PBI_OON 19230); 1 ♀, same data (AM KS102620, PBI_OON 19347); 2 ♀, same data (AM KS102613, PBI_OON 19231); 1 ♀, same data (AM KS102585, PBI_OON 19243); 1 ♀, same data except 1 Mar. 1996 (AM KS102617, PBI_OON 19233); 1 ♂, 1 ♀, same data (AM KS102648, PBI_OON 19345); 1 ♀, same data (AM KS102650, PBI_OON 19343); 5 ♀, same data (AM KS102523, PBI_OON 19308); 2 ♂, same data (AM KS102540, PBI_OON 19322); 4 ♂, 2 ♀, same data (AM KS102539, PBI_OON 19321); 1 ♂, same data (AM KS102550, PBI_OON 19312); 2 ♀, same data except 1 Apr. 2000 (AM KS102581, PBI_OON 19253); 1 ♀, same data (AM KS102519, PBI_OON 23544); 1 ♂, same data (AM KS102614, PBI_OON 23533); 1 ♂, same data (AM KS102546, PBI_OON 19298); 1 ♂, 1 ♀, same data (AM KS102524, PBI_OON 19295); 1 ♀, same data (AM KS102592, PBI_OON 23532); 1 ♀, same data (AM KS102567, PBI_OON 19281); 1 ♀, same data (AM KS102568, PBI_OON 19283); 1 ♀, same data except 1 Feb. 1994 (AM KS102593, PBI_OON 19260); 1 ♂, 2 ♀, Cabbage Tree Fire Trail, Buckenbowra State Forest, 35.62516°S, 150.01866°E, 15 Mar. 1999, R. Harris, H. Smith (AM KS68214, PBI_OON 7623); 2 ♂, 2 ♀, Crowdy Bay National Park, forest, in litter, 31.81666°S, 152.73333°E, 5 May 2007, K. Edwards (QM S78021, PBI_OON 06257); 2 ♂, Myrtle State Forest, litter, 29.19200°S, 153.01833°E, 1 Feb. 1997, A. York (AM KS102831, PBI_OON 20466).

Etymology. The specific name is for Alan York who collected many specimens of this species and other goblin spiders.

Diagnosis. Males and females resemble those of *O. otto* in having a high shouldered carapace and high abdomen with scuto-pedicel region

about diameter of pedicel, both share a field of short setae at postepigastric scutum and in males the prolateral incision at the bulbal tip, but *O. yorki* can be distinguished by the smaller size, the less dense field of setae and the wider bulbal tip (Fig. 68 I). In females the epigastric area in ventral view has epigastric fold (EF) widely triangular and small posterior triangular concavity, posteriorly closed (Fig. 69F).

Description. *Male* (PBI_OON 19273, Figs 68A–J). Total length 1.49. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes, ALE: 0.087; PME: 0.074; PLE: 0.066, ALE largest, ALE circular, PME squared; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, scuto-pedicel region about diameter of pedicel, with paired curved scutal ridges, and additional dorsal ridge (Fig. 68G); postepigastric scutum with circular field of thin setae covering 1/3 of postepigastric scutum and short posteriorly directed lateral apodemes. Palpal patella 0.292 long, 0.185 wide; connection to femur at 0.51; bulb slightly bulging, tip slightly curved medially, with prolateral incision (Fig. 68H, I).

Female (PBI_OON 19318, Figs 69A–G). Total length 1.69. Eyes, ALE: 0.082; PME: 0.076; PLE: 0.066. Epigastric area, ventral view epigastric fold (EF) widely triangular and small posterior triangular concavity, posteriorly closed; in dorsal view paddle-like sclerite (PSc) with arms bent at the end; nail-like process (Na) conical; globular appendix (GAp) mushroom-shaped extension (Fig. 69G).

Distribution. This species is widespread along the coastal areas of New South Wales.

SPECIES FROM NORTHERN TERRITORY

Key to species

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 - Females (unknown for *O. ephemera*, *O. johardingae*, *O. wongalara*)7
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 - Scuto-pediceal region about ½ of diameter of pedicel (Fig. 73G)4
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 - Paired scutal ridges present, long concavity between lateral apodemes with wide central ridge (Figs 78G, C) ... *O. wongalara*
4. Bulbal tip with striated and incised prolateral fold (Figs 73H, I)5
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5. Bulbal tip narrow, prolaterally semicircular (Figs 73H, I) *O. gilliesi*
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 - Paired scutal ridges present, bulbal tip short, with tiny hook (Figs 71H, I) *O. fishriver*
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 - Scuto-pediceal region about ½ of diameter of pedicel or less8
8. Scuto-pediceal region less than ½ of diameter of pedicel (Fig. 74F)..... *O. gilliesi*
 - Scuto-pediceal region about ½ of diameter of pedicel (Fig. 72E)..... *O. fishriver*

Opopaea ephemera Baehr, sp. nov.
(Figs 70A–J)

Material examined. Holotype ♂: AUSTRALIA: Northern Territory: Fish River Station, B5a, vine thicket and eucalypt among boulders, litter, 14.07388°S, 130.78583°E, 22 Apr.–3 May 2012, R. Whyte (MAGNT, PBI_OON 23644).

Other material examined. AUSTRALIA: Northern Territory: 2 ♂, Fish River Station, F26, Heath woodland on sandstone, heathland, litter, 14.04750°S, 130.76638°E, 22 Apr.–3 May 2012, R. Whyte (QM S91155, PBI_OON 23645); 1 ♂, Fish River STN B5a, vine thicket and eucalypt among boulders, litter, 14.07388°S, 130.78583°E, 22 Apr.–3 May 2012, R. Whyte (QM S91159, PBI_OON 23647).

Etymology. The specific name is a noun, the plural neuter of *ephemer* and *ephemeros*, Greek and New Latin for something which lasts a short period of time. The species name refers to the location, an ephemeral waterway at Fish River Station.

Diagnosis. Males resemble those of *O. gilliesi* in having a flat body, with scuto-pediceal region only ½ of diameter of pedicel, paired scutal ridges slightly arched and the broad prolaterally striated and incised bulbal tip but can easily be recognised by book lung covers with longitudinal ridge (Fig. 70G) and the tip with triangular striated prolateral fold (Fig. 70 I).

Description. Male (PBI_OON 23644, Figs 70A–J). Total length 1.20. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace slightly elevated in lateral view, with angular posterolateral corners; lateral margin rebordered, straight, without denticles. Eyes, ALE: 0.062; PME: 0.060; PLE: 0.045, ALE largest, ALE circular, PME oval; posterior eye row recurved from above; PME touching for less than half their length. Abdomen, book lung covers with longitudinal ridge; scuto-pediceal region 1/2 diameter of pedicel, paired scutal ridges not touching. Palpal patella 0.244 long, 0.133 wide, connection to femur at 0.48; bulb stout, ventrally strongly bulging, tip broad with triangular striated prolateral fold, 'fenestra' small.

Female. Unknown.

Distribution. This species is known only from the type locality in the Northern Territory.

Opopaea fishriver Baehr, sp. nov.
(Figs 71A–J, 72A–G)

Material examined. Holotype ♂: AUSTRALIA: Northern Territory: Fish River Station, F 26, Heath woodland on sandstone, heathland, litter, 14.04750°S, 130.76638°E, 22 Apr.–3 May 2012, R. Whyte (MAGNT, PBI_OON 23641). Allotype ♀: collected with holotype (MAGNT, PBI_OON 23642).

Other material examined. AUSTRALIA: *Northern Territory*: 2 ♂, Fish River Station, F 26, Heath woodland on sandstone, heathland, litter, 14.04750°S, 130.76638°E, 22 Apr.–3 May 2012, R. Whyte (QM S91158, PBI_OON 23642); 1 ♀, Fish River Stn S10, Lowland Monsoon Forest, monsoon rainforest, litter, 13.80000°S, 130.71666°E, 22 Apr.–3 May 2012, R. Raven (QM S92323, PBI_OON 23663); 1 ♀, Fish River Stn. S24a/b, riparian monsoon forest, litter, 14.03333°S, 130.75000°E, 22 Apr.–3 May 2012, R. Whyte (QM S92322, PBI_OON 23643); 1 ♂, same data (QM S92322, PBI_OON 23643).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. johardingae* in body shape, having a scuto-pedicel region only ½ of diameter of pedicel but can easily be recognised by the well developed, slightly arched, paired scutal ridges, the wide concavity with weak triangular extension between the lateral apodemes (Fig. 71C) and the narrow tip with tiny prolateral hook and distal incision (Fig. 71 I). Females by epigastric area with tiny knob in dorsal view paddle-like sclerite (PSc) with strongly bowed arms (Fig. 72G).

Description. *Male* (PBI_OON 23641, Figs 71A–J). Total length 1.32. Prosoma, mouthparts, abdominal scutae and legs pale orange, palpal patella orange brown. Carapace broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners; lateral margin rebordered, without denticles. Eyes, ALE: 0.076, PME: 0.072, PLE: 0.069, ALE largest, ALE circular, PME squared; posterior eye row recurved from above; PME touching throughout most of their length. Abdomen, book lung covers with diagonal ridge; scuto-pedicel region less than diameter of pedicel, paired scutal ridges just touching (Fig. 71G); postepigastric scutum, between lateral apodemes concave with wide, weak triangular extension (Fig. 71C). Palpal patella 0.270 long, 0.400 wide, connection to femur at 0.53; bulb ventrally slightly bulged, tip narrow with tiny prolateral hook and distal incision, 'fenestra' small (Figs 71H, I).

Female (PBI_OON 23642, Figs 72A–G). Total length 1.50. Eyes, ALE: 0.073, PME: 0.069, PLE: 0.059. Epigastric area, ventral view chitinized area (Ch) widely bowed, with tiny knob; in dorsal view

paddle-like sclerite (PSc) with strongly bowed arms (Fig. 72G); nail-like process (Na) conical; globular appendix (GAP) globular extension.

Distribution. This species is known only from the type locality in the Northern Territory.

Opopaea gilliesi Baehr, sp. nov.
(Figs 73A–J, 74A–G)

Material examined. Holotype ♂: AUSTRALIA: *Northern Territory*: Wongalara Wildlife Sanctuary, litter, 14.15277°S, 134.16111°E, (3 June 2012, M.S. Harvey (MAGNT, PBI_OON 23658). Allotype ♀: collected with holotype (MAGNT, PBI_OON 23659).

Other material examined. AUSTRALIA: *Northern Territory*: 1 ♂, Wongalara Wildlife Sanctuary, litter, 14.15277°S, 134.16111°E, 3 June 2012, M.S. Harvey (WAM T125975, PBI_OON 23660).

Etymology. This species is name for Chris Gillies of the Earthwatch Institute Australia, recognising his field assistance during the Wonglara BushBlitz.

Diagnosis. Males resemble those of *O. ephemera* in having a flat body, with scuto-pedicel region only ½ of diameter of pedicel, paired scutal ridges slightly arched and broad, prolaterally striated and incised bulbal tip but can easily be recognised by book lung covers without longitudinal ridge and bulbal tip with semicircular striated prolateral fold (Fig. 73 I). Females by epigastric area with tiny knob and wide concavity between lateral apodemes (Fig. 74G).

Description. *Male* (PBI_OON 23658, Figs 73A–J). Total length 1.10. Prosoma, mouthparts, abdominal scutae and legs pale orange. Carapace slightly elevated in lateral view, with angular posterolateral corners; lateral margin rebordered, straight, without denticles. Eyes, ALE: 0.057, PME: 0.057, PLE: 0.049, ALE, PME subequal, larger than PLE, ALE circular, PME oval; posterior eye row recurved from above; PME touching for less than half their length. Abdomen, scuto-pedicel region 1/2 diameter of pedicel, paired scutal ridges arched, touching. Palpal patella 0.243 long, 0.125 wide, connection to femur at 0.52; bulb ventrally strongly bulging, tip broad with semicircular striated prolateral fold, 'fenestra' larger, distally situated.

Female (PBI_OON 23659, Figs 74A–G). Total length 1.33. Eyes, ALE: 0.058, PME: 0.053, PLE: 0.042. Epigastric area, ventral view chitinized area (Ch) widely triangular, with tiny knob and wide concavity between lateral apodemes (Fig. 74G).

Distribution. This species is known only from the type locality in the Northern Territory.

Opopaea johardingae Baehr, sp. nov.
(Figs 75A–J)

Material examined. Holotype ♂: AUSTRALIA: Northern Territory: Fish River STN B5a, savannah woodland, litter, 14.07388°S, 130.78583°E, 22 Apr. 2012–3 May 2012, R. Whyte (MAGNT, PBI_OON 23562).

Etymology. The specific name is for Jo Harding, Bush Blitz Manager of the Australian Biological Resources Study (ABRS), honoring her incredible enthusiasm for Australia's nature.

Diagnosis. Males resemble those of *O. fishriver* in body shape, having a scuto-pedicel region only ½ of diameter of pedicel but can easily be recognised by the absence of paired scutal ridges (Fig. 75G), an elongated opisthosoma with no concavity or extension, and the long and trunk-shaped bulbal tip (Fig. 75 I).

Description. *Male* (PBI_OON 23652, Figs 75A–J). Total length 1.22. Prosoma, mouthparts, abdominal scutae and legs pale orange, palps orange brown. Carapace ovoid, pars cephalica flat in lateral view, with rounded posterolateral corners; lateral margin rebordered, without denticles. Eyes, ALE: 0.051; PME: 0.059; PLE: 0.039, PME largest, ALE circular, PME squared; PME touching throughout most of their length. Abdomen, scuto-pedicel region 1/2 diameter of pedicel, paired scutal ridges absent. Palpal patella 0.243 long, 0.129 wide, connection to femur at 0.52; bulb ventrally slightly bulged, tip long and narrow trunk-shaped, 'fenestra' small, dorsally situated (Fig. 75 I).

Female. Unknown.

Distribution. This species is known only from the type locality in the Northern Territory.

Opopaea preecei Baehr, sp. nov.
(Figs 76A–J, 77A–H)

Material examined. Holotype ♂: AUSTRALIA: Northern Territory: Fish River Station, F 26, heath woodland on sandstone, 14.04750°S, 130.76638°E, 22 Apr. 2012–3 May 2012, R. Whyte (MAGNT, PBI_OON 23649). Allotype ♀: collected with holotype (MAGNT, PBI_OON 23650).

Other material examined. AUSTRALIA: Northern Territory: 1 ♂, collected with holotype (QM S92324, PBI_OON 23649); 1 ♀, Fish River Station, S10, lowland monsoon forest, litter, 13.80000°S, 130.71666°E, 22 Apr.–3 May 2012, R. Raven (QM S92327, PBI_OON 23653).

Etymology. The specific name is for Michael Preece, Director of the Australian Biological Resources Study (ABRS), which supports taxonomic work in Australia.

Diagnosis. Males and females resemble those of *O. fishriver* in general body shape and having a wide concavity between the lateral apodemes but can easily be recognised by scuto-pedicel region about diameter of pedicel, paired scutal ridges absent (Fig. 76G) and in males a 'fenestra' with long fold ending in long narrow prolateral directed trunk-shaped tip. (Fig. 76 I). Females by epigastric area with well defined posterior triangular concavity (Figs 77G, I).

Description. *Male* (PBI_OON 23649, Figs 76A–J). Total length 1.31. Prosoma, mouthparts, abdominal scutae and legs pale orange, palps orange brown. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners; lateral margin undulate, without denticles. Eyes, ALE: 0.067; PME: 0.064; PLE: 0.053, ALE largest, ALE circular, PME circular; posterior eye row straight from above; PME touching for less than half their length. Abdomen, scuto-pedicel region about diameter of pedicel, paired scutal ridges absent (Fig. 76G); postepigastric scutum between anterior spiracles and posterior spiracles with deep concavity. Palpal patella 0.293 long, 0.150 wide, connection to femur at 0.51; bulb ventrally slightly bulging, 'fenestra' with long fold ending in long, narrow prolaterally directed trunk-shaped tip (Fig. 76H).

Female (PBI_OON 23650, Figs 77A–H). Total length 1.45. Eyes, ALE: 0.074; PME: 0.057; PLE: 0.045. Epigastric area, ventral view, chitinized

area (Ch) widely triangular with well defined posterior triangular concavity, knob tiny; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) concave; globular appendix (GAp) a large, conical extension (Figs 77G, H).

Distribution. This species is known only from the type locality in the Northern Territory.

Opopaea wongalara Baehr, sp. nov.
(Figs 78A–J)

Material examined. Holotype ♂: AUSTRALIA: Northern Territory: Wongalara Wildlife Sanctuary, litter, 14.15277°S, 134.16111°E, 3 June 2012, M.S. Harvey (MAGNT, PBI_OON 23657).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. fishriver* in having a wide concavity with weak extension between the lateral apodemes and well developed, slightly arched, paired scutal ridges but can easily be recognised by the scuto-pedicel region about diameter of pedicel and complicated bulbal tip with ventral and prolateral ridge, ‘fenestra’ dorsally situated with fold connecting to prolateral ridge (Fig. 78H, I).

Description. *Male* (PBI_OON 23657, Figs 78A–J). Total length 1.39. Prosoma, mouthparts, abdominal scutae and legs pale orange, palps orange brown. Carapace broadly oval, pars cephalica slightly elevated in lateral view, with angular posterolateral corners; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.073; PME: 0.074; PLE: 0.060, PME largest, ALE oval, PME oval; posterior eye row recurved from above; PME touching for less than half their length. Abdomen, book lung covers with longitudinal ridge; scuto-pedicel region about diameter of pedicel, paired scutal ridges touching at middle (Fig. 78G); postepigastric scutum between lateral apodemes and posterior margin with long concavity with wide central ridge (Fig. 78C). Palpal patella 0.302 long, 0.154 wide, connection to femur at 0.51; bulb ventrally slightly bulging, tip long with ventral and prolateral ridge, ‘fenestra’ dorsally situated with fold connecting to prolateral ridge (Fig. 78H; I).

Female. Unknown.

Distribution. This species is known only from the type locality in the Northern Territory.

SPECIES FROM QUEENSLAND
Key to species

The eight species known from Lamington National Park (*O. antoniae*, *O. jonesae*, *O. leica*, *O. oliveruashii*, *O. rogerkitchingi*, *O. sown*, *O. speighti* and *O. yukii*) are not included in this key as there is a key available in Baehr (2011).

1. Males 2
 - Females (unknown for *O. brisbanensis*, *O. carnarvon*, *O. chrisconwayi*, *O. mcleani*, *O. proserpine*) 15
2. Scuto-pedicel region high, about diameter of pedicel (as Fig. 88G) 3
 - Scuto-pedicel region about ½ of diameter of pedicel (as Fig. 92G) 10
3. Abdomen with paired scutal ridges and additional median ridge (as Fig. 88G) ... 4
 - Abdomen with paired scutal ridges but no median ridge (e.g. Fig. 96G) 6
4. Patella attached to femur medially, cymbium not separated by seam (Fig. 88J) *O. douglasi*
 - Patella attached to femur subbasally, cymbium separated by seam (Fig. 98I) .. 5
5. Postepigastric scutum plain (Fig. 98C) *O. ulrichi*
 - Abdomen with longitudinal ridge between apodemes (Fig. 84C) *O. carnarvon*
6. Abdomen with conical protrusion between apodemes (Fig. 85C) *O. carteri*
 - Abdomen without protrusion between apodemes (as Fig. 96C) 7
7. Sternum with posterior ridge (Fig. 96B) *O. stanisici*
 - Sternum without posterior ridge (Fig. 94B). 8
8. Cymbium with dense field of plumose setae at the top (Fig. 94 I) *O. mcleani*
 - Cymbium evenly covered with plumose

- setae (as Fig. 87J) 9
9. Bulbal tip with prolateral spine-shaped extension, 'fenestra' small (Fig. 87I, J) *O. chrisconwayi*
- Bulbal tip with prolateral ridge, 'fenestra' elongated (Figs 90H, I) *O. lambkii*
10. Bulb with 2 strong prolateral spines (as Fig. 79 I) 11
- Bulb without prolateral spines (as Fig. 82H) 13
11. Sternum between furrows I-II and II-III bulging (Fig. 79B) *O. ameyi*
- Sternum between furrows I-II and II-III not bulging (as Fig. 92B) 12
12. Bulbal tip with long prolateral incision, reaching 'fenestra' (Fig. 92H) .. *O. leichhardtii*
- Bulbal tip, with short prolateral incision (Fig. 81H) *O. brisbanensis*
13. Bulbal tip broad with huge prolateral fold; 'fenestra' large (Figs 95H, I) .. *O. proserpine*
- Bulbal tip without huge prolateral fold; 'fenestra' small (Figs 82H, I) 14
14. Bulbal tip long, spatulate (Figs 82H, I) .. *O. broadwater*
- Bulbal tip short and squat (Platnick and Dupérré, 2009: fig. 102). *O. concolor*
15. 1 Scuto-pedicle region about diameter of pedicle (as Fig. 89E) 16
- Scuto-pedicle region about ½ of diameter of pedicle or less 20
16. Abdomen with paired scutal ridges and additional median ridge (as Fig. 89E) .. 17
- Abdomen with paired scutal ridges but no median ridge (as Fig. 80F) 19
17. Paddle-like sclerite (PSc) with long bent arms (Fig. 89G) *O. douglasi*
- Paddle-like sclerite (PSc) with straight arms only bent at end (as Fig. 97G) 18
18. Triangular plate as wide as lateral apodemes (Fig. 99C) *O. ulrichi*
- Triangular plate 1/2 as wide as lateral apodemes (Fig. 86G) *O. carteri*
19. Abdomen with paired scutal ridges short (Fig. 97E) *O. stanisici*
- Abdomen with paired scutal ridges long, connected at middle (Fig. 91F) . *O. lambkii*
20. Paddle-like sclerite (PSc) with short arms, not reaching epigastric fold (Fig. 83H) *O. broadwater*
- Paddle-like sclerite (PSc) with bent arms reaching epigastric fold (Fig. 80H) 21
21. Scuto-pedicle region less than ½ of diameter of pedicle (Fig. 80F) *O. ameyi*
- Scuto-pedicle region about ½ of diameter of pedicle (Fig. 93F) 22
22. Receptaculum opening situated close to epigastric furrow (Figs 93G, H) .. *O. leichhardtii*
23. Receptaculum opening situated quite far from epigastric furrow (Platnick & Dupérré, 2009: figs 91, 92, 97, 98) *O. concolor*

Opopaea ameyi Baehr, sp. nov.
(Figs 79A–J, 80A–H)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Toomba Homestead site, 395 m, 19.96736°S, 145.57485°E, 28 Sept.–17 Dec. 2006, R. Raven, A. Amey, B. Baehr (QM S95146, PBI_OON 06021). Allotype ♀: collected with holotype (QM S81351, PBI_OON 06021).

Etymology. The specific name is for Andrew Amey who was one of the collectors of the types.

Diagnosis. Males resemble those of *O. brisbanensis* in having flat body with scuto-pedicle region less than diameter of pedicle as well as two strong prolateral spines at the base of the bulb, but can be distinguished by sternum between furrows I-II and II-III being bulging, by lacking the infra-coxal grooves and paired scutal ridges having the two spines close together, a relatively open 'fenestra' with a wide lateral fold and a ribbed prolateral bulbal tip (Fig. 79 I). Females resemble *O. broadwater* in having a flat body and the sternum between furrows I-II and II-III being bulging, but can be separated by epigastric area, dorsal view paddle-like sclerite (PSc) with widely bent arms reaching epigastric fold (Fig. 80H).

Description. *Male* (PBI_OON 06021, Figs 79 A–J). Total length 1.10. Prosoma, mouthparts and abdominal scutae pale orange, palpal patella orange brown, legs yellow. Carapace ovoid in dorsal view, pars cephalica flat in lateral view, with rounded posterolateral corners, top smooth, sides striated; lateral margin rebordered, without denticles. Eyes, ALE: 0.045; PME: 0.041; PLE: 0.037, ALE largest, PME circular; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME touching. Sternum, furrows between coxae reduced, smooth, lateral margin without infra-coxal grooves (Fig. 79B), area between furrows I–II and II–III bulging. Abdomen, book lung covers large, ovoid; scuto-pedicel region less than diameter of pedicel, paired scutal ridges reduced; postepigastric scutum with short posteriorly directed lateral apodemes. Palpal patella 0.220 long, 0.114 wide, connection to femur at 0.45; bulb ventrally slightly bulging with two strong prolateral basal spines close together, a relatively open ‘fenestra’ with a wide lateral fold and a ribbed prolateral bulbal tip (Fig. 79 I).

Female (PBI_OON 6021, Figs 80A–H). Total length 1.13. Eyes, ALE: 0.055; PME: 0.048; PLE: 0.044. Epigastric area, ventral view, epigastric fold (EF) with triangular median part; in dorsal view paddle-like sclerite (PSc) with widely bent arms reaching epigastric fold reaching EF (Fig. 80H); nail-like process (Na) triangular; globular appendix (GAP) divided into rounded hood and short drop-shaped extension.

Distribution. This species is known only from the type locality in central Queensland.

Opopaea antoniae Baehr

Opopaea antoniae Baehr, 2011: 418, figs 1, 11–14, 16–19, 23–25, 46, 47, 63.

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. Males resemble *O. olivernashi* in colour and eye size. Females and males of *O. antoniae* can be separated from all other species of *Opopaea* known from Lamington National

Park by their small, round and darker brown book lung covers. Males of *O. antoniae* and *O. olivernashi* are the only Lamington species with a retrolateral seam between the bulb and cymbium. Males of *O. antoniae* can be easily separated from *O. olivernashi* by their slimmer patella. Females of *O. antoniae* can be distinguished from all other *Opopaea* species from Lamington National Park by the broad triangular chitinized area (Ch) near the genital opening.

Description. *Male:* See Baehr (2011).

Female. See Baehr (2011).

Distribution. This species is known only from the southeast corner of Queensland and north-eastern New South Wales Baehr (2011).

Opopaea brisbanensis Baehr, sp. nov. (Figs 81A–J)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Gold Creek Reservoir, site 1, spotted gum open forest, litter, 27.45883°S, 152.87200°E, 1 Dec. 2003–2 Jan. 2004, Queensland Museum Party (QM S91122, PBI_OON 19047).

Other material examined. AUSTRALIA: Queensland: 2 ♂, Gold Creek Reservoir, site 1, spotted gum open forest, litter, 27.45883°S, 152.87200°E, 1 Dec. 2003–2 Jan. 2004, Queensland Museum Party (QM S54708, PBI_OON 19235).

Etymology. The specific name is an adjective taken from the type locality.

Diagnosis. Males resemble those of *O. aueyi* in having a flat body with a scuto-pedicel region less than diameter of the pedicel as well as two strong prolateral spines at the base of the bulb, but can be distinguished by having two spines about half their length apart (Fig. 81H), a narrow ‘fenestra’ without a wide lateral fold and a prolateral tip with a short incision (Fig. 81 I).

Description. *Male* (PBI_OON 19235, Figs 81A–J). Total length 1.18. Prosoma, mouthparts and abdominal scutae pale orange; palpal patella orange brown, legs yellow. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners. Eyes, ALE: 0.054; PME: 0.061; PLE: 0.051, PME largest, PME oval; posterior eye

row straight from both above and front; ALE separated by their radius to diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum furrows between coxae reduced, smooth, lateral margin with infra-coxal grooves and anterior and posterior openings. Abdomen, scuto-pedicle region $\frac{1}{2}$ diameter of pedicle with paired scutal ridges connected at middle. Palpal patella 0.231 long, 0.124 wide, connection to femur at 0.41; bulb ventrally bulging at base, with two strong prolateral basal spines about half their length apart, narrow 'fenestra' and incised tip (Figs 81H, I).

Female. Unknown.

Distribution. This species is known only from the Brisbane area in south-eastern Queensland.

Opopaea broadwater Baehr, sp. nov.
(Figs 82A–J, 83A–H)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Lake Broadwater via Dalby, 27.35000°S, 151.10000°E, 17 May–25 Nov. 1985, M. Bennie (QM S78194 PBI (PBI_OON 06624). Allotype ♀: collected with holotype (QM S91147, PBI_OON 23612).

Other material examined. AUSTRALIA: Queensland: 2 ♂, 6 ♀, Lake Broadwater via Dalby, 27.35000°S, 151.10000°E, 17 May–25 Nov. 1985, M. Bennie (QM S91148, PBI_OON 23613).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males and females resemble those of *O. ameyi* in general body shape, having a scuto-pedicle region about $\frac{1}{2}$ diameter of pedicle, paired scutal ridges strong, and a additional median ridge. Males similarly have a medial attachment of the palpal femur but can be distinguished by the long, spatulate, medially bent tip and small 'fenestra' (Fig. 82 I). Females can be distinguished by the epigastric area in dorsal view with paddle-like sclerite (PSc) with straight arms bent at the end (Fig. 83H).

Description. *Male* (PBI_OON 06624, Figs 82A–J). Total length 1.49. Prosoma, mouthparts and abdominal scutae pale orange, legs white. Carapace with angular posterolateral corners; lateral margin with blunt denticles. Eyes, ALE: 0.069; PME: 0.076; PLE: 0.062, PME

largest, PME oval; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE touching, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide, furrows with rows of small pits, microsculpture only in furrows. Abdomen, scuto-pedicle region $\frac{1}{2}$ diameter of pedicle, paired scutal ridges strong, connected at middle with additional median ridge. Palpal patella 0.317 long, 0.171 wide, connection to femur at 0.58; bulb ventrally slightly bulging, completely fused to cymbium, tip long, spatulate, medially bent with small 'fenestra' (Fig. 82 I).

Female (PBI_OON 6624, Figs 83A–H). Total length 1.65. Eyes, ALE: 0.075; PME: 0.070; PLE: 0.070. Epigastric area, ventral view, epigastric fold (EF) slightly bowed, with tiny knob; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) long conical; globular appendix (GAp) globular.

Distribution. This species is known only from Lake Broadwater in southern Queensland.

Opopaea carnarvon Baehr, sp. nov.
(Figs 84A–I)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Carnarvon Gorge National Park, forest, litter, 25.03333°S, 148.23333°E, 5–9 Aug. 2011, B. Baehr (QM S95147, PBI_OON 23602).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. ulrichi* in having a high shouldered carapace and high abdomen with scuto-pedicle region about diameter of pedicle, both share a subbasally attached femur and a strongly bulging bulb separated from the cymbium by a seam, but can be distinguished by the longitudinal ridge covering the anterior $\frac{1}{3}$ of postepigastric scutum (Fig. 84C).

Description. *Male* (PBI_OON 0002302, Figs 84A–I). Total length 1.40. Prosoma, mouthparts, abdominal scutae and legs orange brown. Carapace high shouldered, with angular

posterolateral corners, sides striated; lateral margin without denticles. Eyes, ALE: 0.072; PME: 0.067; PLE: 0.056, ALE largest, PME squared; posterior eye row straight from above, procurved from front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Sternum as long as wide, furrow with rows of small pits. Abdomen, scuto-pedicle region about diameter of pedicle, with strong paired scutal ridges and additional median ridge; postepigastric scutum with longitudinal ridge covering anterior 1/3 (Fig. 84C). Palpal patella 0.145 long, 0.098 wide, attachment to femur subbasal at 0.31; bulb ventrally strongly bulging, separated from cymbium by seam, tip long, thin, bent medially with small 'fenestra' (Figs 84 F-H).

Female. Unknown.

Distribution. This species is known only from Carnarvon National Park in central Queensland.

Opopaea carteri Baehr, sp. nov.
(Figs 85A-J, 86A-G)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Redlands, scribbly gum open forest, litter, 249 m, 27.90000°S, 153.40000°E, 19 Jan.-19 Feb. 2009, R.J. Raven (QM S86904, PBI_OON 23407). Allotype ♀: Mt Cotton, Sandy Creek Cons Area, litter, 40 m, 27.98333°S, 153.40000°E, 1-21 Dec. 2009, R. Raven (QM S88184, PBI_OON 23479).

Other material examined. AUSTRALIA: Queensland: 1 ♂, Belmont Hills Bushlands, site 1, 27.50784°S, 153.11750°E, 2-29 Jan. 2004, Queensland Museum Party (QM S54710, PBI_OON 6900); 1 ♀, Boondall Wetlands, site 1, Melaleuca woodland, litter, 27.33683°S, 153.07120°E, 30 Jan.-1 Mar. 2004, QM Party (QM S79475, PBI_OON 20735); 1 ♂, same data (QM S79475, PBI_OON 20735); 5 ♂, Buhot Creek, Burbank, 27.58783°S, 153.16980°E, 17 Apr. 2003, C. Burwell, S. Wright, E. Volschenk (QM S62248, PBI_OON 6858); 1 ♂, Chelsea Road Bushlands Reserve, 27.47634°S, 153.18580°E, 16 Apr. 2003, C. Burwell, S. Wright (QM S62542, PBI_OON 6854); 5 ♂, 3 ♀, Gold Creek Reservoir, site 1, 27.45883°S, 152.87200°E, 1-30 Oct. 2003, QM Party (QM S54711, PBI_OON 6819); 9 ♂, 7 ♀, same data (QM S54714, PBI_OON 6852); 13 ♂, 10 ♀, same data except 1 Dec. 2003-2 Jan. 2004 (QM S91123, PBI_OON 21530); 6 ♂, 3 ♀, Karawatha Forest, site 6, 27.62217°S, 153.08730°E,

2-31 Oct. 2003, QM Party (QM S67311, PBI_OON 6820); 1 ♂, 1 ♀, 17 Apr.-26 May 2003, C. Burwell, S. Wright, E. Volschenk (QM S62705, PBI_OON 6825); 5 ♂, 2 ♀, 1-29 July 2003, S. Wright, E. Volschenk (QM S62914, PBI_OON 6838); 3 ♂, 31 Mar.-29 Apr. 2004, QM Party (QM S67315, PBI_OON 6851); 1 ♂, Lota Creek, Manly West, Melaleuca woodland, litter, 5 m, 27.49527°S, 153.18555°E, 19 Mar. 2006, M. Ramírez, R. Raven, B. Baehr, C. Griswold, D. Silva (QM S87991, PBI_OON 7503); 5 ♂, N Stradbroke Island, "Gordon" (Gc), 75 m, 27.65000°S, 153.40000°E, U. Nolte (QM S40988, PBI_OON 6803).

Etymology. The specific name is a patronym in honor of Mr. Dan Carter of Redlands City Council.

Diagnosis. Males and females resemble those of *O. ulrichi* in having a high shouldered carapace and high abdomen with scuto-pedicle region about the diameter of the pedicle, in male both sharing a more subbasally attached femur and a strongly bulging bulb, separated from cymbium by a seam, but distinguished by the 2 strong prolateral basal spines (Fig. 85H) and the postepigastric scutum with conical protrusion between the anterior and posterior spiracles (Figs 85C, F). In females the epigastric area in ventral view has epigastric fold (EF) strongly triangular, triangle not reaching 1/2 of concavity (Fig. 86F).

Description. *Male* (PBI_OON 23407, Figs 85A-J). Total length 1.37. Prosoma, mouthparts, abdominal scutae and legs yellow-brown. Carapace with angular posterolateral corners, sides striated; lateral margin without denticles. Eyes, ALE: 0.080; PME: 0.076; PLE: 0.060, ALE largest, PME squared; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Abdomen, scuto-pedicle region about diameter of pedicle, with strong paired scutal ridges and additional median ridge (Fig. 85G); postepigastric scutum with conical protrusion between the anterior and posterior spiracles (Fig. 85C, F). Palpal patella attached subbasally, 0.164 long, 0.105 wide, connection to femur at 0.31; bulb ventrally strongly bulging, basally separated from cymbium, with 2 strong prolateral basal spines, tip long, thin, bent medially (Fig. 85C, F).

Female (PBI_OON 23479, Figs 86A–F). Total length 1.61. Eyes, ALE: 0.076; PME: 0.069; PLE: 0.062. Epigastric area, ventral view, epigastric fold (EF) strongly triangular with posterior concavity between lateral apodemes; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) narrow conical; globular appendix (GA) cylindrical (Fig. 86G).

Distribution. This species is known only from the Brisbane area in South East Queensland.

Opopaea chrisconwayi Baehr & Smith, sp. nov.
(Figs 87A–K)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Mt Cotton, Sandy Creek Conservation Area, litter, 40 m, 27.98333°S, 153.40000°E, 1–31 Jan 2010, R. Raven (QM S88255, PBI_OON 23469).

Other material examined. AUSTRALIA: Queensland: 1 ♂, Mt Cotton, Sandy Creek Conservation Area, litter, 40 m, 27.98333°S, 153.40000°E, 1–31 Jan 2010, R. Raven (QM S88255, PBI_OON 23470); 1 ♂, Redlands, Eastern Escarpment Conservation Area, litter, 120 m, 27.98333°S, 153.35000°E, 1 Jan.–5 Feb. 2010, J. Stanisic (QM S84849, PBI_OON 23471).

Etymology. The specific name is for Chris Conway, who supplied Helen Smith with coffee and tall tales during many visits to London.

Diagnosis. Males resemble those of *O. lambkiniae* in having no median scutal ridge, a medially attached femur and a prolaterally incised palpal tip, but can easily be distinguished by a spine-shaped extension, ‘fenestra’ small (Figs 87I, J).

Description. *Male* (PBI_OON 23469, Figs 87A–K). Total length 1.33. Prosoma, mouthparts abdominal scutae and legs pale orange, palpal patella orange brown. Carapace broadly oval, pars cephalica slightly elevated with rounded posterolateral corners, sides striated; lateral margin with blunt denticles. Eyes, ALE: 0.061; PME: 0.062; PLE: 0.054, PME largest, PME squared; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME touching. Sternum longer than wide, furrows with small pits. Abdomen, scuto-pedicle region about diameter of pedicle, paired scutal

ridges weak, not connected at middle. Palpal patella 0.289 long, 0.155 wide, connection to femur 0.51; bulb ventrally slightly bulging with incised prolateral tip and a spine-shaped extension, ‘fenestra’ small (Fig. 87I, J).

Female. Unknown.

Distribution. This species is known only from the Brisbane area in South East Queensland.

Opopaea douglasi Baehr, sp. nov.
(Figs 88A–J, 89A–G)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Redlands, scribbly gum open forest, Leaf Litter, 249m, 27.90000°S, 153.40000°E, 21 Nov.–19 Dec. 2008, R. Raven (QM S86919, PBI_OON 23422). Allotype ♀: collected with holotype (QM S86919, PBI_OON 23423).

Other material examined. AUSTRALIA: Queensland: 1 ♂, Belmont Hills Bushlands, site 1, 27.50784°S, 153.11750°E, 28 July–1 Sept. 2003, QM Party (QM S62221, PBI_OON 6841); 4 ♂, 3 ♀, Karawatha Forest, site 6, 27.62217°S, 153.08730°E, 31 Oct.–1 Dec. 2003, QM Party (QM S67312, PBI_OON 6835); 1 ♂, Mt Cotton, Sandy Creek Conservation Area, litter, 40 m, 27.98333°S, 153.40000°E, 1 Feb.–4 Mar. 2010, R.J. Raven (QM S88255, PBI_OON 23438); 1 ♂, same data (QM S84849, PBI_OON 23452); 7 ♂, same data (QM S88214, PBI_OON 23463); 2 ♂, same data except 9 Feb. 2010, A. Nakamura (QM S88354, PBI_OON 23455); 3 ♂, 1–21 Dec. 2009, R. Raven (QM S88227, PBI_OON 23458); 2 ♂, Redlands, scribbly gum open forest, litter, 249 m, 27.90000°S, 153.40000°E, 19 Jan.–19 Feb. 2009, R.J. Raven (QM S86904, PBI_OON 23408); 4 ♂, same data (QM S79338, PBI_OON 23410); 1 ♂, same data (QM S79381, PBI_OON 23416); 3 ♂, same data (QM S86935, PBI_OON 23417); 1 ♂, same data (QM S79326, PBI_OON 23419); 2 ♂, 2 ♀, 21 Nov.–19 Dec. 2008, R. Raven (QM S86919, PBI_OON 23421); 2 ♀, Redlands, Eastern Escarpment Conservation Area, litter, 120 m, 27.98333°S, 153.35000°E, 1 Mar.–12 May 2010, J. Stanisic (QM S84858, PBI_OON 23464); 2 ♀, 1 Feb.–4 Mar. 2010, R. Raven (QM S88166, PBI_OON 23473); 1 ♀, same data except 10 Feb. 2010 (QM S84904, PBI_OON 23477); 2 ♀, Redlands, Victoria Point, litter, 20 m, 27.96666°S, 153.45000°E, 1–31 Dec. 2009, R. Raven (QM S84941, PBI_OON 23472); 1 ♀, same data except 1 Feb.–4 Mar. 2010, R. Raven (QM S84957, PBI_OON 23474).

Etymology. The specific name is a patronym in honor of the environmentalist Mr. Bob Douglas who devoted his life to nature projects in the Redlands Shire.

Diagnosis. Males resemble those of *O. chrisconwayi* in having a medially attached femur and a slightly bulging bulb which is completely fused, but can be distinguished by strong paired scutal ridges and additional median ridge and the s-shaped prolateral tip without incision (Fig. 88 I). Females can be separated from all other Queensland species by the epigastric area, in dorsal view having a paddle-like sclerite (PSc) with strongly bent arms reaching far beyond epigastric fold (Fig. 89G).

Description. *Male* (PBI_OON 23402, Figs 88A–J). Total length 1.24. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace broadly oval in dorsal view, pars cephalica strongly elevated in lateral view, high shouldered with angular posterolateral corners, sides strongly reticulate, lateral margin, rebordered, without denticles. Eyes, ALE: 0.074; PME: 0.065; PLE: 0.055, ALE largest, ALE circular, PME oval, PLE circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Abdomen, book lung covers small; scuto-pedicel region about diameter of pedicel, with strong paired scutal ridges and additional median ridge. Palpal patella 0.260 long, 0.146 wide, connection to femur 0.47; bulb ventrally slightly bulging with s-shaped prolateral tip, ‘fenestra’ small (Figs 88H, I).

Female (PBI_OON 23403, Figs 89A–G). Total length 1.31. Eyes, ALE: 0.065; PME: 0.069; PLE: 0.055, PME largest; posterior eye row recurved from above. Epigastric area, ventral view, epigastric fold (EF) slightly bowed, with small median knob; in dorsal view paddle-like sclerite (PSc) with strongly bent arms reaching far beyond epigastric fold (Fig. 89G); nail-like process (Na) triangular; globular appendix (GAp) divided into globular hood and drop-shaped extension.

Distribution. This species is known only from the Brisbane, Redlands area in Southern Queensland.

Opopaea jonesae Baehr

Opopaea jonesae Baehr, 2011: 419, figs 2, 10, 29–31, 52, 53, 62, 63

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. *Opopaea jonesae* resembles *O. rogerkitchingi* in colour and in having small eyes which are equal in size. Males of *O. jonesae* and *O. rogerkitchingi* have a slim bulb and a palpal patella with a median connection to the femur (C/L=0.51). Males of *O. jonesae* can be easily separated by a longitudinal band of setae at the swollen posterior part of the sternum between coxae IV (Baehr 2011: fig. 62) and the medially bent flagellate distal tip of the bulb. Females can be distinguished from those of *O. rogerkitchingi* by the narrow, widely triangular chitinized area near the genital opening.

Description. *Male:* See Baehr (2011).

Female. See Baehr (2011).

Distribution. Only known from the southeast corner of Queensland.

Opopaea lambkinae Baehr, sp. nov. (Figs 90A–J, 91A–H)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Carnarvon Station (CN3P1), rocky cliffs, litter, 690 m, 24.83694°S, 147.63194°E, 25 Nov.–14 Dec. 2010, C. Zwick (QM S92334, PBI_OON 23670). Allotype ♀: collected with holotype (QM S92335, PBI_OON 23671).

Other material examined. AUSTRALIA: Queensland: 2 ♂, Carnarvon Station (CN3P1), litter, 690 m, 24.83694°S, 147.63194°E, 7 Nov. 2010–25 Nov. 2012, Starick, Lambkin, Zwick (QM S92336, PBI_OON 23672); 1 ♂, same data except 25 Nov.–14 Dec. 2010, C. Zwick (QM S92338, PBI_OON 23673).

Etymology. The specific name is for Dr Christine Lambkin, Curator of Entomology at Queensland Museum, who collected some of the specimens.

Diagnosis. Males resemble those of *O. chrisconwayi* in having weak paired scutal ridges, a medially attached femur and a slightly bulging bulb which is completely fused, but can be distinguished by the bulbal tip being narrow with a small prolateral incision and ventral ridge, ‘fenestra’ elongate (Fig. 90 I). Females can be distinguished from all other

Queensland species by the epigastric area, in dorsal view having a globular appendix (GAp) with long extension (Fig. 91H).

Description. *Male* (PBI_OON 23670, Figs 90A–J). Total length 1.42. Prosoma, mouthparts and abdominal scutae orange brown, legs pale orange. Carapace broadly oval, high-shouldered with 2 pairs of strong setae, with angular posterolateral corners, lateral margin rebordered with blunt denticles. Eyes, ALE: 0.083; PME: 0.078; PLE: 0.066, ALE largest, PME squared; posterior eye row recurved from above, straight from front; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Abdomen, book lung covers large, ovoid; scuto-pedicle region about diameter of pedicle, paired scutal ridges weak, just touching; postepigastric scutum between lateral apodemes concave with circular protrusion. Palpal patella 0.271 long, 0.142 wide, connection to femur at 0.55; cymbium with slender curved, plumose setae that have a pointed tip; bulb ventrally slightly bulging, tip narrow with small prolateral incision and prolateral ridge, 'fenestra' large, elongate (Fig. 90I, J).

Female (PBI_OON 23671, Figs 91A–H). Total length 1.45. Eyes, ALE: 0.077; PME: 0.085; PLE: 0.054, PME largest. Epigastric area, ventral view, epigastric fold (EF) slightly bowed, with tiny knob; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) small, triangular; globular appendix (GAp) long extension (Fig. 91G, H).

Distribution. This species is known only from Carnarvon Station in central Queensland.

Opopaea leica Baehr

Opopaea leica Baehr, 2011: 422, figs 3, 26–28, 48, 49, 60, 63

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. *Opopaea leica* resembles *O. antoniae* and *O. olivernashi* in colour and the large size of the eyes but males of *O. leica* can be easily separated by the sternal posterior hump and hair tuft between coxae IV (Baehr 2011: fig.

60) and by the absence of a retrolateral seam separating the bulb from cymbium. Females resemble *O. olivernashi* but can be distinguished by having their globular appendix (GAp) separated into a small posterior globular and a hoodlike anterior part, with the GAp well separated from the chitinized plate (Ch).

Description. *Male*: See Baehr (2011).

Female. See Baehr (2011).

Distribution. Only known from the southeast corner of Queensland.

Opopaea leichhardti Baehr, sp. nov. (Figs 92A–J, 93A–H)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Cudmore National Park, eucalypt forest, litter, 365 m, 22.89388°S, 146.35472°E, 27 Oct. 2010–2 Aug. 20011, C. Lambkin, N. Starick (QM S95133, PBI_OON 23700). Allotype ♀: collected with holotype (QM S95134, PBI_OON 23701).

Etymology. The species is named in honor of the German explorer and scientist Ludwig Leichhardt (1813–1848), who came to Australia in 1842 to study its wildlife. This is for his 200th anniversary in 2013.

Diagnosis. Males and females resemble those of *O. ameyi* in having flat body with scuto-pedicle region less than diameter of pedicle and males with two strong prolateral spines at the base of the bulb, but can be distinguished by having well developed paired scutal ridges at scuto-pedicle region, by having a long triangular ridge between apodemes (Fig. 92C). Females in having the sternum between furrows I–II and II–III not bulging (Fig. 93C).

Description. *Male* (PBI_OON 23700, Figs 92A–J). Total length 1.12. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow. Carapace ovoid in dorsal view, slightly elevated in lateral view, with angular posterolateral corners, surface smooth, sides striated, lateral margin rebordered, without denticles. Eyes, ALE: 0.060; PME: 0.057; PLE: 0.053, ALE largest, ALE circular, PME oval, PLE circular; posterior eye row recurved from above, straight from front; ALE separated by their radius to diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum

longer than wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits, surface smooth. Abdomen, scuto-pediceal region about $\frac{1}{2}$ of pedicel diameter, scutal ridges connected at middle. Palpal patella 0.224 long, 0.139 wide, connection to femur at 0.37; bulb ventrally slightly bulged, with two strong prolateral basal spines, tip broad prolaterally deeply incised, connected to fenestra (Figs 92H, I).

Female (PBI_OON 23701, Figs 93A-H). Total length 1.47. Eyes, ALE: 0.088; PME: 0.069; PLE: 0.063. Epigastric area, ventral view, epigastric fold (EF) slightly bowed, with tiny knob; in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) small, triangular; globular appendix (GAp) triangular (Fig. 93H).

Distribution. This species is known only from the Cudmore National Park in central Queensland.

Opopaea mcleani Baehr, sp. nov.
(Figs 94A-J)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Bulimba Creek, Carindale, 27.50150°S, 153.10570°E, 2-29 Jan. 2004, QM Party (QM S67390, PBI_OON 06828).

Other material examined. AUSTRALIA: Queensland: 1 ♂, Buhot Creek, Burbank, riparian forest, 27.58783°S, 153.16980°E, 12 Dec. 2003-1 Jan. 2004, QM Party (QM S65778, PBI_OON 6857).

Etymology. The specific name is a patronym in honor of Mr. Stacey McLean, Senior Program Officer, Parks and Environmental Planning, Brisbane City Council, who initiated the Brisbane habitat survey through which most of the specimens were collected.

Diagnosis. Males resemble those of *O. chrisconwayi* in having weak paired scutal ridges, a medially attached femur and a prolateral incision at the bulbal tip, but can be distinguished by the dense field of plumose setae at the top of the cymbium and the lack of a spine-shaped extension at the bulbal tip (Fig. 94 I).

Description. *Male* (PBI_OON 06828, Figs 94A-J). Total length 2.12. Prosoma, mouthparts and abdominal scutae orange brown, legs pale orange. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, sides striated; lateral

margin rebordered, with blunt denticles. Eyes, ALE: 0.095; PME: 0.084; PLE: 0.077, ALE largest, PME squared; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Abdomen, scuto-pediceal region about diameter of pedicel, paired scutal ridges weak, not connected at middle. Palpal patella 0.350 long, 0.222 wide, connection to femur at 0.50; cymbium completely fused with bulb, no seam visible, with distal patch of plumose setae; bulb ventrally strongly bulging, completely fused to cymbium, tip with prolateral incision at the bulbal tip, 'fenestra' small (Fig. 94 I).

Female. Unknown.

Distribution. This species is known only from the Brisbane area in South East Queensland.

Opopaea olivernashi Baehr

Opopaea olivernashi Baehr, 2011: 429, figs 4, 20-22, 44, 45, 61, 63

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. *Opopaea olivernashi* resembles *O. antoniae* in colour and eye size. Males of *O. olivernashi* and *O. antoniae* are the only Lamington species with a retrolateral seam between the bulb and cymbium. Males of *O. olivernashi* can be easily separated by their broad patella, the more subbasal connection to the femur ($C/L = 0.37$), the sternum with an anterior fold just behind labium, about $\frac{3}{4}$ of the length of the labium (Baehr 2011: fig. 61), and the more swollen bulb. Females can be distinguished from all other *Opopaea* species by the globular appendix divided into a hood and a v-shaped extension (Baehr 2011: fig. 45).

Description. *Male:* See Baehr (2011).

Female. See Baehr (2011).

Distribution. Only known from the southeast corner of Queensland.

Opopaea proserpine Baehr, sp. nov.
(Figs 95A–J)

Material examined. Holotype ♂: AUSTRALIA: Queensland: Proserpine, Airport Drive (site XY12), forest, bark, 32m, 20.48777°S, 148.56500°E, 6 Nov. 2007, R. Raven (QM S92329, PBI_OON 23664).

Other material examined. AUSTRALIA: Queensland: 4 ♂, Proserpine, Airport Drive (site XY12), forest, bark, 32 m, 20.48777°S, 148.56500°E, 6 Nov. 2007, R. Raven (QM S86794, PBI_OON 23665); 1 ♂, Proserpine, XY, 20.48333°S, 148.55000°E, 1 Jan. 2007, R. Raven (QM S85724, PBI_OON 23120); 1 ♂, same data (QM S85999, PBI_OON 23199).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. broadwater* in general body shape, having a scuto-pedical region with paired scutal ridges, additional median ridge and a medial attachment of the femur but can be easily recognised by the broad tip with huge striated prolateral fold and the large more distally situated ‘fenestra’ (Figs 95H, I).

Description. *Male* (PBI_OON 23230 Figs 95A–J). Total length 1.43. Prosoma, mouthparts and abdominal scutae yellow-brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, sides striated; lateral margin rebordered without denticles; pars thoracica with 3 setae on each side. Eyes, ALE: 0.065, PME: 0.071, PLE: 0.056, PME largest, PME squared; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Abdomen, scuto-pedical region less than diameter of pedicel, with additional median scutal ridge, paired scutal ridges weak, just touching. Palpal patella 0.280 long, 0.136 wide, connection to femur at 0.47; bulb ventrally slightly bulging, tip broad with huge striated prolateral fold, ‘fenestra’ large, situated distally.

Female. Unknown.

Distribution. This species is known only from the Proserpine area of coastal Queensland.

Opopaea rogerkitchingi Baehr

Opopaea rogerkitchingi Baehr, 2011: 430, figs 5, 35–37, 54, 55, 63.

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. *Opopaea rogerkitchingi* resembles *O. jonesae* in colour and both species have small eyes that are equal in size. Males of *O. rogerkitchingi* and *O. jonesae* also share a slim bulb, and a palpal patella with a median connection to the femur ($C/L=0.52$). Males of *O. rogerkitchingi* can be easily separated by the centrally directed sternal setae between coxae IV and the distal part of bulb which has a medially bent, sharp tip (Baehr 2011: fig. 36). Females of *O. rogerkitchingi* can be distinguished from those of *O. jonesae* by the broad chitinized area near the genital opening.

Description. *Male:* See Baehr (2011).

Female. See Baehr (2011).

Distribution. Only known from the south-eastern corner of Queensland.

Opopaea speighti Baehr

Opopaea speighti Baehr, 2011: 433, figs 7, 41–43, 58, 59, 63.

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. *Opopaea speighti* resembles *O. leica* in having a completely fused bulb and cymbium, and a triangular, medially bent distal part of the bulb (Baehr 2011: fig. 42). Males of *O. speighti* can be easily separated by their flat sternum which lacks any posterior swelling between coxae IV. Females of *O. speighti* can be distinguished from those of all other *Opopaea* species by the genitalia which have a narrow, triangular, posteriorly directed extension of the chitinized area in ventral view (Baehr 2011: fig. 58) and the globular appendix divided into a widely triangular, hood-shaped anterior part and a small, globular posterior extension that is not embedded in the chitinized area (Baehr 2011: fig. 59).

Description. *Male:* See Baehr (2011).

Female. See Baehr (2011).

Distribution. Only known from the southeast corner of Queensland.

Opopaea stanisici Baehr, sp. nov.
(Figs 96A–J, 97A–G)

Material examined. Holotype ♂: AUSTRALIA: *Queensland*: Redlands, scribbly gum open forest, litter, 249 m, 27.90000°S, 153.40000°E, 19 Jan.–19 Feb. 2009, R.J. Raven (QM S86904, PBI_OON 23405). Allotype ♀: collected with holotype (QM S79357, PBI_OON 23411).

Other material examined. AUSTRALIA: *Queensland*: 1 ♂, Mt Cotton, Sandy Creek Cons Area, litter, 40 m, 27.98333°S, 153.40000°E, 1 Feb.–4 Mar. 2010, R.J. Raven (QM S88213, PBI_OON 23437); 4 ♂, 1 ♀, same data (QM S84805, PBI_OON 23439); 1 ♂, same data (QM S84893, PBI_OON 23451); 1 ♀, same data except 1–21 Dec. 2009, R. Raven (QM S88227, PBI_OON 23461); 1 ♂, Redlands, scribbly gum open forest, litter, 249 m, 27.90000°S, 153.40000°E, 19 Jan.–19 Feb. 2009, R.J. Raven (QM S86904, PBI_OON 23406); 9 ♂, 2 ♀, same data (QM S79357, PBI_OON 23412); 1 ♂, same data (QM S79353, PBI_OON 23413); 1 ♂, same data (QM S87160, PBI_OON 23414); 9 ♂, 1 ♀, same data (QM S79381, PBI_OON 23415); 3 ♂, 2 ♀, same data (QM S79326, PBI_OON 23418); 1 ♂, Redlands, Eastern Escarpment Conservation Area, litter, 120 m, 27.98333°S, 153.35000°E, 8–11 Feb. 2010, C. Burwell, A. Nakamura (QM S88297, PBI_OON 23440); 2 ♂, same data except 1–31 Jan. 2010, R. Raven (QM S84992, PBI_OON 23453); 2 ♂, 1 Feb.–4 Mar. 2010, R. Raven (QM S88167, PBI_OON 23467); 1 ♀, 14 Feb. 2010, A. Nakamura (QM S88353, PBI_OON 23476).

Etymology. The specific name is for Dr John Stanisic, land snail researcher and Principal Biodiversity Scientist ('The Snail Whisperer'), BAAM (Biodiversity Assessment and Management) who conducted this survey.

Diagnosis. Males resemble those of *O. mcleani* in having weak paired scutal ridges, a medially attached femur and a prolateral incision at the bulbal tip, but can be distinguished by the sternum with posterior ridge (Fig. 96B) and the long medially bent, spatulate bulbal tip (Fig. 96I). Females have the epigastric fold (EF) with a triangular median part and small posterior triangular concavity (Fig. 97F, G).

Description. *Male* (PBI_OON 23405, Figs 96A–J). Total length 1.33. Prosoma, mouthparts and abdominal scutae orange brown, legs pale

orange. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, sides striated; lateral margin rebordered without denticles. Eyes, ALE: 0.060; PME: 0.062; PLE: 0.055, PME largest, PME circular; posterior eye row straight from both above and front; ALE separated by less than their radius, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum: longer than wide, with posterior ridge. Abdomen, scuto-pediceal region about diameter of pedicel, paired scutal ridges weak, not connected at middle. Palpal patella 0.296 long, 0.158 wide, connection to femur at 0.50; bulb ventrally slightly bulging, completely fused to cymbium, with long spatulate, medially bent tip, connected with 'fenestra' by a fold (Fig. 96I).

Female (PBI_OON 23411, Figs 97A–G). Total length 1.52. Eyes, ALE: 0.063; PME: 0.053; PLE: 0.045. Epigastric area, ventral view, epigastric fold (EF) with triangular median part and small posterior triangular concavity (Fig. 97F, G).

Distribution. This species is known only from the Brisbane Redlands area in South East Queensland.

Opopaea ulrichi Baehr, sp. nov.
(Figs 1, 98A–J, 99A–G)

Material examined. Holotype ♂: AUSTRALIA: *Queensland*: Mt Glorious, rainforest, in litter, 690 m, 27.33333°S, 152.76670°E, 15 Mar. 2008, U. Baehr (QM S92339, PBI_OON 23697). Allotype ♀: collected with holotype (QM S92340, PBI_OON 23698).

Other material examined. AUSTRALIA: *Queensland*: 1 ♂, Mt Glorious, rainforest, leaf litter, 690 m, 27.33333°S, 152.76670°E, 20 Sept. 1979, G. Monteith (QM S12866, PBI_OON 21541); 3 ♀, Mt Glorious, rainforest, in litter, 690 m, 27.33333°S, 152.76670°E, 15 Mar. 2008, U. Baehr (QM S84079, PBI_OON 22896); 1 ♂, 1 ♀, Mt Tenison Woods, 620 m, 27.32333°S, 152.72170°E, 15 May 1997, G. Monteith (QM S43085, PBI_OON 6709).

Etymology. The specific name is for Ulrich Baehr, son of the senior author, who collected the types.

Diagnosis. Males and females resemble those of *O. carteri* in having a high shouldered carapace and high abdomen but in *O. ulrichi* the scuto-pediceal region is more than diameter of pedicel.

Males of both species have a more subbasally attached femur and a strongly bulging bulb which is separated from cymbium basally by a seam, but can be distinguished by the absence of 2 strong prolateral basal spines (Fig. 98G) and the postepigastric scutum has no conical protrusion between the anterior and posterior spiracles. In females the epigastric area in ventral view has epigastric fold (EF) strongly triangular, triangle wide, reaching more than $\frac{1}{2}$ of concavity (Figs 99F, G).

Description. *Male* (PBI_OON 23697, Figs 1, 98A–J). Total length 1.71. Prosoma, mouthparts and abdominal scutae orange brown, legs yellow-brown. Carapace broadly oval, high shouldered, with angular posterolateral corners, sides striated; lateral margin rebordered without denticles. Eyes very large, ALE: 0.094; PME: 0.085; PLE: 0.076, ALE largest, PME oval; posterior eye row straight from above, procurved from front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME. Abdomen, scuto-pedicle region more than diameter of pedicle, with strong paired scutal ridges and additional median ridge, plumose setae lateral of pedicle. Palpal patella 0.202 long, 0.142 wide, connection to femur at 0.30; bulb ventrally strongly bulging with basal seam between cymbium and bulb, tip broad, prolaterally incised, with huge prolateral fold connecting ‘fenestra’ with large spatulate, medially bent tip (Figs 98G, H).

Female (PBI_OON 23698, Figs 99A–G). Total length 1.94. Eyes, ALE: 0.087; PME: 0.078; PLE: 0.057. Epigastric area, ventral view, epigastric fold (EF) widely triangular, with triangular median part; in dorsal view paddle-like sclerite (PSc) with short, straight arms bent at the end; nail-like process (Na) triangular; globular appendix (GAp) long, funnel-shaped (Fig. 99G).

Distribution. This species is known only from the Mt Glorious area in south-eastern Queensland.

Opopaea yukii Baehr

Opopaea yukii Baehr, 2011: 434, figs 8, 9, 38–40, 56, 57, 63.

Material examined. See Baehr (2011).

Other material examined. See Baehr (2011).

Diagnosis. Males and females of *O. yukii* can be easily separated from all other *Opopaea* species from Lamington National Park by their flat bodies and long oval abdomens (Baehr 2011: figs 8, 9). The male sternum has no posterior swelling between coxae IV and the distal end of the palpal bulb is long, medially bent and scoop-shaped. Females can be distinguished from those of all other *Opopaea* species by having the chitinized area a narrow band with a small sinuous posterior extension (Baehr 2011: Fig. 56) in ventral view and the globular appendix not divided but small, globular and embedded in the chitinized area (Baehr 2011: fig. 57).

Description. *Male:* See Baehr (2011).

Female. See Baehr (2011).

Distribution. Only known from the southeast corner of Queensland.

SPECIES FROM SOUTH AUSTRALIA Key to species

1. Males 2
 - Females (unknown for *O. mundy*, *O. stevensi*) 5
2. Scuto-pedicle region about $\frac{3}{4}$ diameter of pedicle or more (Fig. 104G) 3
 - Scuto-pedicle region about $\frac{1}{2}$ diameter of pedicle (Fig. 102G) *O. millbrook*
3. Eyes small (Figs 104A, D), bulbal tip narrow spatulate with deep prolateral incision (Figs 104H, I) *O. mundy*
 - Eyes large (Figs 100D, 105D), bulbal tip beak-shaped, with small prolateral incision (Figs 100I, 105 I) 4
4. PME largest, bulbal tip broad, retrolateral part evenly rounded (Fig. 105 I) *O. stevensi*
 - ALE largest, bulbal tip narrow, retrolateral part s-shaped (Fig. 100 I) *O. banksi*
5. Eyes small, scuto-pedicle region about $\frac{1}{2}$ diameter of pedicle (Fig. 103E) ... *O. millbrook*

- Eyes big, scuto-pedichel region about $\frac{3}{4}$ diameter of pedichel (Fig. 101F) . . *O. banksi*

***Opopaea banksi* (Hickman, 1950)**
(Figs 100A–J, 101A–H)

Gamasomorpha banksi Hickman, 1950: 13, figs 12–14.

Material examined. Holotype ♂: AUSTRALIA: *South Australia*: Reevesby Island 34.55305°S, 136.26694°E, 1 Dec. 1936, J. Clark (MVMA K110, PBI_OON 23677). Allotype ♀: collected with holotype (MVMA K111, PBI_OON 23678).

Diagnosis. Males resemble those of *O. stevensi* in having a scuto-pedichel region about $\frac{3}{4}$ diameter of pedichel, paired scutal ridges not medially connected, a strongly bulging bulb, tip short medially bent, with a prolateral incision but can be distinguished by the narrow bulbal tip, with s-shaped retolateral part (Fig. 100 I). Females can be separated from *O. millbrook*, the only other known female from SA by the higher opisthosoma with scuto-pedichel region about $\frac{3}{4}$ diameter of pedichel (Fig. 101F).

Description. *Male* (PBI_OON 23677, Figs 100A–J). Total length 1.44. Prosoma, mouthparts, abdominal scutae orange brown and legs pale orange. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, top smooth, sides striated, lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.082; PME: 0.077; PLE: 0.066, ALE largest, ALE circular, PME oval, PLE circular; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Abdomen, book lung covers large, ovoid, with longitudinal ridge; scuto-pedichel region about $\frac{3}{4}$ diameter of pedichel, paired scutal ridges not medially connected. Palpal patella 0.292 long, 0.165 wide, connection to femur at 0.48; bulb ventrally strongly bulging, tip narrow with tiny acute beak-shaped ending and tiny prolateral incision and small ‘fenestra’.

Female (PBI_OON 23678, Fig. 101A–H). Total length 1.60. Eyes, ALE: 0.076; PME: 0.057; PLE: 0.056. Female palpal tarsus thickened. Epigastric area, ventral view, epigastric fold (EF) widely bowed with narrow triangular extension medially;

in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end; nail-like process (Na) tiny conical; globular appendix (GAp) mushroom-shaped Fig. 101H).

Distribution. This species is known only from Reevesby Island in the southern part of South Australia. Although originally described in the genus *Gamasomorpha*, Brignoli (1975) correctly transferred this species to *Opopaea*.

***Opopaea millbrook* Baehr, sp. nov.**
(Figs 102A–J, 103A–G)

Material examined. Holotype ♂: AUSTRALIA: *South Australia*: Millbrook Reservoir, 34.81666°S, 138.80000°E, 22 Feb.–27 Mar. 2002, D. Hirst (SAMA NN23304, PBI_OON 22884). Allotype ♀: collected with holotype (SAMA NN23306, PBI_OON 23667).

Other material examined. AUSTRALIA: *South Australia*: 1 ♂, Millbrook Reservoir, 34.81666°S, 138.80000°E, 22 Feb.–27 Mar. 2002, D. Hirst (SAMA NN23305, PBI_OON 23666).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. mundy* in having paired scutal ridges not medially connected, a strongly bulging bulb, tip short, medially bent and with a prolateral incision but can be distinguished by having a scuto-pedichel region about $\frac{1}{2}$ diameter of pedichel, a larger incision and the tip with rectangular striated prolateral fold (Fig. 102 I). Females have the epigastric fold (EF) slightly bowed with long median triangular extension (Fig. 103G).

Description. *Male* (PBI_OON 22884, Figs 102A–J). Total length 1.23. Prosoma, mouthparts, abdominal scutae orange brown and legs pale orange. Carapace slightly elevated in lateral view, with angular posterolateral corners; lateral margin rebordered with blunt denticles. Eyes, ALE: 0.047; PME: 0.049; PLE: 0.043, PME largest, ALE circular, PME squared; posterior eye row straight from above; ALE separated by less than their radius, PME touching throughout most of their length, PLE-PME touching. Abdomen, scuto-pedichel region $\frac{1}{2}$ diameter of pedichel, paired scutal ridges weak, just touching; postepigastric scutum between lateral apodemes concave with wide,

weak triangular extension. Palpal patella 0.228 long, 0.135 wide, connection to femur at 0.48; bulb ventrally slightly bulging, tip broad with rectangular striated prolateral fold, 'fenestra' small (Figs 102H, I).

Female (PBI_OON 23667, Figs 103A–G). Total length 1.36. Eyes, ALE: 0.051; PME: 0.035; PLE: 0.033. Epigastric area, ventral view, epigastric fold (EF) slightly bowed with long median triangular extension; in dorsal view paddle-like sclerite (PSc) with straight arms; nail-like process (Na) narrow conical; globular appendix (GAp) divided into small hood and long extension (Fig. 103G).

Distribution. This species is known only from the type locality in the Adelaide Hills of South Australia.

Opopaea mundy Baehr, sp. nov.
(Figs 104A–J)

Material examined. Holotype ♂: AUSTRALIA: *South Australia*: Mundy Dam, open shrubland, litter, 26.67333°S, 133.01666°E, 12–16 Aug. 1998 (SAMA NN10580, PBI_OON 22883).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. banksi* in having a scuto-pediceal region about $\frac{3}{4}$ diameter of pedicel and a strongly bulging bulb with a prolaterally incised, short medially bent bulbal tip but can be distinguished by the narrow spatulate tip with deep prolateral incision (Fig. 104 I).

Description. *Male* (PBI_OON 22883, Figs 104A–J). Total length 1.48. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow. Carapace slightly elevated in lateral view, with angular posterolateral corners; lateral margin rebordered with blunt denticles. Eyes, ALE: 0.050; PME: 0.056; PLE: 0.040, PME largest, ALE circular, PME oval; posterior eye row straight from above; ALE separated by more than their diameter, PME touching for less than half their length, PLE–PME separated by less than PME radius. Abdomen, scuto-pediceal region less than diameter of pedicel, paired scutal ridges weak. Palpal patella 0.268 long, 0.148 wide,

connection to femur at 0.52; bulb ventrally strongly bulging, tip narrow with prolateral incision, 'fenestra' small, retrolaterally situated, margin with kerb (Fig. 104 I).

Female. Unknown.

Distribution. This species is known only from the type locality in central part of South Australia.

Opopaea stevensi Baehr, sp. nov.
(Figs 105A–J)

Material examined. Holotype ♂: AUSTRALIA: *South Australia*: Hiltaba Station, Casuarina woodland, litter, 32.19444°S, 135.10388°E, 12–22 Nov. 2012, B. Baehr (SAMA NN28001, PBI_OON 23699).

Etymology. The specific name is in honor of Mark Stevens from the South Australian Museum who organised the BushBlitz trip for the South Australian Museum.

Diagnosis. Males resemble those of *O. banksi* in having a scuto-pediceal region about $\frac{3}{4}$ diameter of pedicel and a strongly bulging bulb with a prolaterally incised, short medially bent bulbal tip but can be distinguished by the narrow acute beak-shaped tip with tiny prolateral incision, with evenly rounded retrolateral part (Fig. 105 I).

Description. *Male* (PBI_OON 23699, Figs 105A–J). Total length 1.42. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs yellow. Carapace ovoid in dorsal view, pars cephalica slightly elevated, with angular posterolateral corners, surface smooth, sides finely reticulate, lateral margin undulate, rebordered, with blunt denticles. Eyes, ALE: 0.064; PME: 0.076; PLE: 0.062, PME largest, ALE circular, PME oval, PLE circular; posterior eye row straight from both above and front; ALE separated by their radius to diameter, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Abdomen, scuto-pediceal region about diameter of pedicel, paired scutal ridges medially connected. Palpal patella 0.224 long, 0.139 wide, connection to femur at 0.37; bulb strongly bulging ventrally, with narrow acute beak-shaped tip with tiny prolateral incision, 'fenestra' small, retrolateral part of tip evenly rounded (Fig. 105 I).

Female. Unknown.

Distribution. This species is known only from the type locality in central South Australia.

SPECIES FROM WESTERN AUSTRALIA
Key to species

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 - Scuto-pedichel region lower 3
3. Scuto-pedichel region about 1 1/3 of diameter of pedichel (as Fig. 142G)..... 4
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 - Paired scutal ridges medially not connected (Fig. 142G) *O. rugosa*
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 - Palp with broad rectangular deeply incised tip (Figs 109H, I) *O. billroth*
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 - With elevated triangle between lateral apodemes (as Fig. 130C)..... 15
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 - Abdomen elongated, narrow, well defined triangle (Fig. 145C) *O. triangularis*
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Opopaea aculeata Baehr & Harvey, sp. nov.
(Figs 106A–J)

Material examined. Holotype ♂: **AUSTRALIA: Western Australia:** 20 km WNW of Rhodes Ridge, 23.05361°S, 119.17666°E, 1 Sept. 2003–16 Oct. 2004, CALM Pilbara Survey (WAM T82064, PBI_OON 04031).

Etymology. The specific name *aculeata* is a Latin adjective (feminine) meaning having a spine and refers to the prolateral palpal process of the species.

Diagnosis. Males resemble those of *O. gracilis* in general body shape, having reduced eyes, scuto-pedichel area less than $\frac{1}{2}$ diameter of pedichel, paired scutal ridges absent and sternum distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV, but can be distinguished by the two strong prolateral bulbal spines and the narrow tip connected with long narrow ‘fenestra’ through fold (Fig. 106 I).

Description. *Male* (PBI_OON 04031, 106A–J). Total length 1.09. Prosoma, mouthparts and abdominal scutae yellow, legs white, palps orange brown. Carapace elongate oval, flat with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, without denticles. Eyes reduced, ALE: 0.028; PME: 0.042; PLE: 0.029, PME largest, ALE circular, PME oval; posterior eye row recurved from above; ALE separated by more than their diameter, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum about twice as long as wide, without radial furrows between coxae I–II, II–III, III–IV, surface smooth, distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV. Abdomen cylindrical; book lung covers large, ovoid; pedichel unmodified, scuto-pedichel area less than $\frac{1}{2}$ diameter of pedichel, paired scutal ridges absent; dorsal scutum, epigastric scutum and postepigastric scutum weakly sclerotized; postepigastric scutum long, semicircular, without posteriorly directed lateral apodemes; epigastric region with sperm pore large, circular, unmodified. Palpal patella 0.233 long, 0.115 wide, connection to femur at 0.50; bulb ventrally slightly bulging, with 2 prolateral spines, tip thin, connected with long narrow ‘fenestra’ through fold.

Female. Unknown.

Distribution. This species is known only from the type locality in Western Australia.

Opopaea aurantiaca Baehr & Harvey, sp. nov.
(Figs 107A–J, 108A–G)

Material examined. Holotype ♂: **AUSTRALIA: Western Australia:** 12 km NE of Mile Camp, 22.70722°S, 119.70916°E, 10 Aug. 2003–21 Oct. 2004, CALM Pilbara Survey (WAM T81866, PBI_OON 04521). Allotype ♀: collected with holotype (WAM T121116, PBI_OON 19437).

Other material examined. **AUSTRALIA: Western Australia:** 4 ♀, Bonney Downs Homestead, 22.09472°S, 119.75333°E, 7 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T73369, PBI_OON 4522); 2 ♂, 1 ♀, 6 km N of Cowra Line Camp, 22.30166°S, 119.01333°E, 14 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T81867, PBI_OON 4528); 1 ♀, 7 km SE of Marda Pool, 21.06972°S, 116.20666°E, 25 Sept. 2003–

3 Oct. 2004, CALM Pilbara Survey (WAM T81868, PBI_OON 4532); 1 ♂, 1 ♀, 58 km ESE Meentheena Outcamp, 21.32194°S, 121.00222°E, 30 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T81880, PBI_OON 4442); 3 ♂, 11 ♀, 12 km NE of Mile Camp, 22.70722°S, 119.70916°E, 10 Aug. 2003–21 Oct. 2004, CALM Pilbara Survey (WAM T121117, PBI_OON 20369); 1 ♂, 3 ♀, 24 km NNE of Nullagine, 21.67722°S, 120.15527°E, 4 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T81881, PBI_OON 4449); 1 ♂, 1 ♀, 56 km N of Nullagine, 21.67833°S, 120.08833°E, 19 May 2004–18 May 2005, CALM Pilbara Survey (WAM T81882, PBI_OON 4450); 1 ♂, 1 ♀, 56 km N of Nullagine, 21.67833°S, 120.08833°E, 2 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T81883, PBI_OON 4451).

Etymology. The specific name *aurantiaca* is a Latin adjective (feminine) meaning orange-colored in reference to the orange color of the species.

Diagnosis. Males resemble those of *O. billroth* in general body shape, having scuto-pedicel area higher than diameter of pedicel, with strong medially connected paired scutal ridges and plumose setae lateral of pedicel, but can be distinguished by the narrow polaterally incised palpal tip and small 'fenestra' (Fig. 107 I). Females resemble those of *O. rugosa* in having scuto-pedicel area higher than diameter of pedicel, but can easily be separated by epigastric area, ventral view, epigastric fold (EF) with median concavity reaching lateral apodemes (Fig. 108F).

Description. *Male* (PBI_OON 04521, Figs 107A–J). Total length 1.86. Prosoma, mouthparts, abdominal scutae yellow and legs orange. Carapace broadly oval, pars cephalica strongly elevated in lateral view, with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides finely reticulate; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.088; PME: 0.084; PLE: 0.088, ALE = PLE, ALE circular, PME squared; posterior eye row recurved from above; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME touching. Abdomen, book lung covers large, ovoid; scuto-pedicel region higher than diameter of pedicel, with strong medially connected paired scutal ridges and plumose setae lateral of pedicel, paired ridges with 6–7 small teeth; epigastric

scutum between sperm pore and posterior spiracles a field of deep impressions. Palpal patella 0.366 long, 0.190 wide, connection to femur at 0.58; bulb ventrally slightly bulging, tip narrow, prolaterally incised, with striated prolateral ridge and small 'fenestra' (Figs 107H, I).

Female (PBI_OON 19437, Figs 108A–G). Total length 2.05. Eyes, ALE: 0.082; PME: 0.089; PLE: 0.064. Epigastric area, ventral view, epigastric fold (EF) widely bowed, with small knob and median concavity reaching lateral apodemes; in dorsal view paddle-like sclerite (PSc) with long continuously bent arms (Fig. 108G); nail-like process (Na) short; globular appendix (Ga) ending as triangle posteriorly.

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea billroth Baehr & Harvey, sp. nov.
(Figs 109A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 12 km ESE of Mt Billroth, 21.66250°S, 117.70472°E, 5 May 2004–18 May 2005, CALM Pilbara Survey (WAM T817331, PBI_OON 04378).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 5 km WSW of Python Pool, 21.34111°S, 117.18833°E, 8 May 2003–12 May 2005, CALM Pilbara Survey (WAM T121120, PBI_OON 48260).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. aurantiaca* in general body shape, having scuto-pedicel area larger than diameter of pedicel, with strong medially connected paired scutal ridges and plumose setae lateral of pedicel, but can be distinguished by the smaller eyes, the broad rectangular deeply incised palpal tip with two additional v-shaped folds (Figs 109H, I).

Description. *Male* (PBI_OON 04378, Figs 109A–J). Total length 1.87. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides granulate; lateral margin

straight, rebordered, with blunt denticles. Eyes, ALE: 0.064; PME: 0.058; PLE: 0.048, ALE largest, ALE circular, PME circular; posterior eye row recurved from above; ALE separated by more than their diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum furrows barely visible. Abdomen globular; scuto-pedicel area larger than diameter of pedicel, with strong medially connected paired scutal ridges and plumose setae lateral to pedicel. Palpal patella 0.367 long, 0.185 wide, connection to femur at 0.58, bulb ventrally slightly bulging with broad rectangular deeply incised palpal tip and two additional v-shaped folds (Figs 109H, I).

Female. Unknown.

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea callani Baehr & Harvey, sp. nov.
(Figs 110A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Barrow Island, 20.78666°S, 115.45472°E, 1 May 2007, S. Callan, K. Edward (WAM T89193, PBI_OON 23623).

Etymology. This species is named for Shae Callan, collector of the type specimens.

Diagnosis. Males resemble those of *O. rixi* in general body shape, having scuto-pedicel area less than diameter of pedicel, paired scutal ridges not connected at middle and postepigastric scutum with concavity between lateral apodemes, but can be distinguished by the long and narrow bulbal tip, retrolaterally bulging at height of narrow 'fenestra' (Fig. 110 I).

Description. *Male* (PBI_OON 23623, Figs 110A–J). Total length 1.50. Prosoma, mouthparts, palpal patella and abdominal scutae pale orange, legs yellow. Carapace ovoid with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.072; PME: 0.063; PLE: 0.063, ALE largest, ALE circular, PME squared; posterior eye row straight from above; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout

most of their length, PLE-PME separated by less than PME radius. Abdomen, book lung covers large, ovoid; scuto-pedicel region less than diameter of pedicel; paired curved scutal ridges nearly straight, not connected at middle; postepigastric scutum with weak longitudinal ridge between apodemes. Palpal patella 0.287 long, 0.148 wide, connection to femur at 0.54; bulb ventrally slightly bulging, with long and narrow tip, retrolaterally bulging at height of narrow 'fenestra' (Fig. 110 I).

Female. Unknown.

Distribution. This species is known only from Barrow Island in Western Australia.

Opopaea cowra Baehr & Harvey, sp. nov.
(Figs 111A–I)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 6 km N of Cowra Line Camp, 22.30166°S, 119.01333°E, 14 Aug.–18 Oct. 2004, CALM Pilbara Survey (WAM T82015, PBI_OON 04688).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. johannae* in general body shape, having a finely reticulated carapace, scuto-pedicel region less than diameter of pedicel, paired scutal ridges short, not connected, patella connection to femur at anterior half and the broad complex folded bulbal tip but can be distinguished by the strong medially directed prolateral extension at the middle of the bulb (Fig. 111H).

Description. *Male* (PBI_OON 04688, Figs 111A–I). Total length 1.41. Prosoma, mouthparts and abdominal scutae pale orange, palpal patella orange brown, legs yellow. Carapace with angular posterolateral corners, finely reticulate; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.071; PME: 0.066; PLE: 0.053, ALE largest, ALE circular, PME oval; posterior eye row straight from above; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Abdomen ovoid, rounded posteriorly; book

lung covers small, ovoid; scuto-pediceal region less than diameter of pedicel, paired scutal ridges short, not connected. Palpal patella 0.252 long, 0.144 wide, connection to femur at 0.58; bulb ventrally slightly bulging, with strong medially directed prolateral extension at the middle of the bulb, tip broad with short, prolateral, ribbed fold bent distally, 'fenestra' between extension and fold (Fig. 111H).

Female. Unknown.

Distribution. This species is known only from the type locality in the Pilbara region of Western Australia.

Opopaea durranti Baehr & Harvey, sp. nov.
(Figs 112A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 13.5 km W of Henry River crossing on Uaroo Glen Florrie Road, 22.91777°S, 115.57750°E, 1 Oct. 2003–30 Sept. 2004, CALM Pilbara Survey (WAM T81979, PBI_OON 04649).

Other material examined. AUSTRALIA: *Western Australia*: 5 ♂, 21 km WNW of Bonney Downs Homestead, 22.09472°S, 119.75333°E, 7 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T78350, PBI_OON 4653); 3 ♂, 13.5 km W of Henry River crossing on Uaroo Glen Florrie Road, 22.91777°S, 115.57750°E, 1 Oct. 2003–30 Sept. 2004, CALM Pilbara Survey (WAM T121134, PBI_OON 23625).

Etymology. This species is named for Bradley Durrant, who collected and sorted much of the Pilbara Survey spiders.

Diagnosis. Males resemble those of *O. gracillima* in having scuto-pediceal region about 1/2 diameter of pedicel, paired ridges nearly straight, connected medially and palpal tip narrow with longitudinal prolateral ridge, but can be distinguished by the pointed, ventrally incised tip and the small 'fenestra' (Figs 112H, I).

Description. *Male* (PBI_OON 04649, Figs 112A–J). Total length 1.44. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.070; PME: 0.066; PLE: 0.052, ALE largest, ALE circular,

PME oval; posterior eye row straight from above; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits. Abdomen, book lung covers small, ovoid; scuto-pediceal region about 1/2 diameter of pedicel, paired ridges flat, connected medially. Palpal patella 0.270 long, 0.142 wide, connection to femur at 0.58; bulb ventrally strongly bulging, tip pointed, ventrally incised with one prolateral folded ridge, 'fenestra' small (Figs 112H, I).

Female. Unknown.

Distribution. This species is known only from Pilbara in Western Australia.

Opopaea ectognophus Harvey & Edward

Opopaea ectognophus Harvey and Edward, 2007: 10–12, figs 1–5.

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Mesa G, 24.8 km SW of Pannawonica (Borehole MEGRC0130, trap 2), 21°44'10"S, 116°06'28"E, depth 20 m, (March–May 2005, M. Greenham, D. Kamien and L. Mould (WAM T65789).

Diagnosis. *Opopaea ectognophus* and *O. phineus* are the only fully blind species of the genus currently known. *Opopaea ectognophus* differs from *O. phineus* by being significantly smaller (total length 1.12 versus 1.50), the dorsal abdominal scute only partially covers the opisthosoma (it covers all of the opisthosoma in *O. phineus*), the shape of the carapace in which the postero-lateral margins of *O. ectognophus* are rounded, and less angulate than in *O. phineus*, and the sternum of *O. ectognophus* lacks apodemes leading away from coxae II–IV which are present in *O. phineus*.

Description. *Male.* See Harvey and Edward (2007).

Female. Unknown.

Distribution. This species is known only from a single bore in the Pilbara region of Western Australia.

Opopaea exoculata Baehr & Harvey, sp. nov.
(Figs 113A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Moorimoodinina, 22.45194°S, 119.97611°E, 9 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T78373, PBI_OON 04028).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, Moorimoodinina, 22.45194°S, 119.97611°E, 9 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T121113, PBI_OON 23615).

Etymology. The specific name *exoculata* is a Latin adjective (feminine) meaning having no eyes and refers to the strongly reduced eyes to pale areas that look eye-shaped of the species.

Diagnosis. Males resemble those of *O. aculeata* in general body shape, having reduced eyes, scuto-pedicle area less than ½ diameter of pedicle, paired scutal ridges absent and sternum distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV, but can be distinguished by the absence of the two strong prolateral bulbal spines and the broad spatulate tip, ‘fenestra’ small (Figs 113H, I).

Description. *Male* (PBI_OON 04028, Figs 113A–J). Total length 1.01. Prosoma, mouthparts and abdominal scutae yellow, legs white, palps orange brown. Carapace elongate oval in dorsal view, pars cephalica flat in lateral view, with rounded posterolateral corners, surface smooth, front pale brown; lateral margin straight, rebordered, without denticles. Eyes strongly reduced to pale areas. Sternum about twice as long as wide, without radial furrows between coxae I–II, II–III, III–IV, distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV. Abdomen, book lung covers large, ovoid; scuto-pedicle region less than ½ diameter of pedicle, pedicle without dorsolateral extensions, paired scutal ridges absent. Palpal patella 0.234 long, 0.111 wide, connection to femur at 0.52; bulb ventrally slightly bulging with broad spatulate tip and longitudinal ridge prolaterally, ‘fenestra’ small (Figs 113H, I).

Female. Unknown.

Distribution. This species is known only from the type locality situated in the Pilbara region of Western Australia.

Opopaea flava Baehr & Harvey, sp. nov.
(Figs 114A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 7 km SE of Marda Pool, 21.06972°S, 116.20666°E, 25 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82070, PBI_OON 04037).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 9 km NW of Lake Poongkaliyarra, 20.93972°S, 117.03472°E, 3 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82067, PBI_OON 4034); 3 ♂, 7 km SE of Marda Pool, 21.06972°S, 116.20666°E, 25 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82068, PBI_OON 4035); 6 ♂, same data (WAM T82094, PBI_OON 5039); 1 ♂, same data (WAM T121118, PBI_OON 23617); 1 ♂, 1.2 km SSE of Millstream, 21.60416°S, 117.07750°E, 14 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T82073, PBI_OON 4040); 1 ♂, 3.5 km WNW of Mt Gregory, 20.85250°S, 117.09583°E, 5 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82064, PBI_OON 4032); 1 ♂, 5 km WSW of Python Pool, 21.34111°S, 117.18833°E, 8 May 2004–12 May 2005, CALM Pilbara Survey (WAM T82069, PBI_OON 4036); 1 ♂, 13.5 km W of Wickham, 20.68833°S, 117.00666°E, 6 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82072, PBI_OON 4039).

Etymology. The specific name *flava* is a Latin adjective (feminine) meaning yellow and refers to the yellow body color of the species.

Diagnosis. Males resemble those of *O. exoculata* in general body shape, having scuto-pedicle area less than ½ diameter of pedicle and sternum distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV, but can be distinguished by the presence of the eyes and by the elongated, flat abdomen with a longitudinal ridge from the sperm pore to the middle of the postepigastric scutum (Figs 114C, G).

Description. *Male* (PBI_OON 4037, Figs 114A–J). Total length 1.18. Prosoma, mouthparts and abdominal scutae yellow, legs white, palps orange brown. Carapace elongate oval in dorsal view, pars cephalica flat in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin rebordered, without denticles. Eyes, silver; ALE: 0.048; PME:

0.066; PLE: 0.047, PME largest, ALE circular, PME oval; posterior eye row recurved from above; ALE separated by more than their diameter, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, without radial furrows between coxae I-II, II-III, III-IV, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings, distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV. Abdomen elongated; book lung covers large, ovoid; scuto-pedicel area less than $\frac{1}{2}$ diameter of pedicel, with paired scutal ridges not connected and plumose setae lateral of pedicel, pedicel tube with triangular, lateral extensions; postepigastric scutum with a longitudinal ridge from the epigastric fold to the middle of the postepigastric scutum. Palpal patella, 0.241 long, 0.122 wide, connection to femur at 0.53; bulb ventrally slightly bulging, tip with prolaterally pointed, distally striated 'fenestra' small, close to tip (Fig. 114 I).

Female. Unknown.

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea fragilis Baehr & Harvey, sp. nov.
(Figs 115A-J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Mt. Gibson Station, eucalypt forest, litter, 29.68972°S, 117.36638°E, 21–29 Aug. 2001, R. Leys, K. Ottewell (WAM T129257, PBI_OON 22894).

Etymology. The specific name *fragilis* is a Latin adjective (feminine) meaning fragile and refers to the fragile body shape of this species.

Diagnosis. Males resemble those of *O. exoculata* in general body shape, having reduced eyes, scuto-pedicel area less than $\frac{1}{2}$ diameter of pedicel, paired scutal ridges absent and a sternum distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV, but can be distinguished by the presence of eyes and bulbal tip with deep prolateral distally striated excavation (Fig. 115 I).

Description. *Male* (PBI_OON 22894, Figs 115A–J). Total length 1.18. Prosoma, mouthparts and abdominal scutae yellow, legs white, palps orange brown. Carapace elongate oval in dorsal view, pars cephalica flat in lateral view, with rounded posterolateral corners, surface smooth, lateral margin undulate, rebordered, without denticles. Eyes reduced, tiny, ALE: 0.023; PME: 0.024; PLE: 0.022, PME largest, all eyes circular; posterior eye row recurved from above, straight from front; ALE separated by more than their diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME separated by less than PME radius. Sternum longer than wide, without radial furrows between coxae I-II, II-III, III-IV, surface smooth, without pits, distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV. Abdomen ovoid; book lung covers small, ovoid; scuto-pedicel area less than $\frac{1}{2}$ diameter of pedicel, without scutal ridges; dorsal scutum weakly sclerotized, covering $\frac{3}{4}$ of abdomen; postepigastric scutum weakly sclerotized, covering about $\frac{3}{4}$ of abdominal length. Palpal patella 0.192 long, 0.098 wide, connection to femur at 0.43; bulb ventrally strongly bulging, tip with deep prolateral excavation, distally striated, 'fenestra' small (Fig. 115 I).

Female. Unknown.

Distribution. This species is known only from the type locality in Western Australia.

Opopaea framenau Baehr & Harvey, sp. nov.
(Figs 116A–J, 117A–H)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Hepburn Heights site HH3, 31.81722°S, 115.77027°E, 13 July–25 Sept. 1995, M. Harvey, J. Waldock (WAM T121131, PBI_OON 23632). Allotype ♀: collected with holotype (WAM T121141, PBI_OON 46762).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 1 ♀, Hepburn Heights, site HH3, 31.81722°S, 115.77027°E, 13 July–25 Sept. 1995, M. Harvey, J. Waldock (WAM T84867, PBI_OON 18029); 1 ♂, Hepburn Heights, site HH4, 31.81583°S, 115.77805°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T121148, PBI_OON 23635).

Etymology. This species is named for Volker Framenau for his immense contributions to arachnology.

Diagnosis. Males and females resemble those of *O. marangaroo* in general body shape, scuto-pedicel area about diameter of pedicel and paired curved scutal ridges present, not connected at middle. Males similarly have the palpal cymbium separated by a seam, but can be distinguished by the palpal patella connection to femur at 0.36 (Fig. 116J). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) arms strongly bent at half way, ends reaching beyond epigastric fold (Fig. 117H).

Description. *Male* (PBI_OON 23632, Figs 116A–J). Total length 1.40. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.087; PME: 0.076; PLE: 0.067, ALE largest, ALE circular, PME squared; posterior eye row straight from above; ALE separated by less than their radius, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, surface smooth, covered with small pits between coxae IV. Abdomen ovoid; book lung covers small, ovoid; scuto-pedicel region about diameter of pedicel, paired scutal ridges weak not medially connected. Palpal patella 0.276 long, 0.164 wide, connection to femur at 0.36; cymbium with round patch of slender curved plumose setae that have a pointed tip; bulb ventrally strongly bulging, with seam between cymbium and bulb, tip broad with prolateral incision and folds, ‘fenestra’ small (Figs 116H, I).

Female (PBI_OON 46762, Figs 117A–H). Total length 1.51. Eyes, ALE: 0.064; PME: 0.061; PLE: 0.049. Epigastric area, ventral view, epigastric fold (EF) posterior margin widely triangular, medially narrowed; in dorsal view paddle-like sclerite (PSc) arms strongly bent at half way, end reaching beyond epigastric fold; nail-like process (Na) small conical; globular appendix

(GAp) divided into hood and drop-shaped extension (Figs 117G, H).

Distribution. This species is known only from the type locality in Western Australia.

Opopaea gracilis Baehr & Harvey, sp. nov.
(Figs 118A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 19.7 km WNW of Mt Berry, 22.43750°S, 116.27416°E, 8 Sept. 2003–10 Oct. 2004, CALM Pilbara Survey (WAM T82062, PBI_OON 04029).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 7.5 km NNW of Mt Berry, 22.42472°S, 116.43250°E, 10 Sept. 2003–19 Oct. 2004, CALM Pilbara Survey (WAM T81941, PBI_OON 4582); 2 ♂, 10.5 km W of Mt De Courcy, 22.71111°S, 116.40027°E, 7 Sept. 2003–11 Oct. 2004, CALM Pilbara Survey (WAM T81942, PBI_OON 4583).

Etymology. The specific name *gracilis* is a Latin adjective (feminine) meaning slender or slim and refers to the slender body shape of the species.

Diagnosis. Males resemble those of *O. aculeata* in having reduced eyes, scuto-pedicel area less than 1/2 diameter of pedicel, paired scutal ridges absent, sternum distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV and two strong prolateral bulbal spines, but can be distinguished by the shorter palpal tip and the ‘fenestra’ not connected (Fig. 118H).

Description. *Male* (PBI_OON 04029, Figs 118A–J). Total length 1.21. Prosoma, mouthparts and abdominal scutae yellow, legs white, palps orange brown. Carapace elongate, pars cephalica flat in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides finely reticulate; lateral margin straight, rebordered, without denticles. Eyes reduced, barely visible, ALE: 0.045; PME: 0.051; PLE: 0.046, PME largest, ALE circular, PME oval; posterior eye row recurved from above; ALE separated by more than their diameter, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, without radial furrows between coxae I–II, II–III, III–IV, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings, distance between coxae II and III greater

than distance between coxae I and II, and coxae III and IV. Abdomen, book lung covers large, ovoid; scuto-pedicle area less than 1/2 diameter of pedicle, paired scutal ridges absent; pedicle without small, dorsolateral, triangular extensions. Palpal patella 0.262 long, 0.131 wide, connection to femur at 0.51; bulb ventrally slightly bulging with two strong prolateral spines, tip narrow, trunk-shaped, 'fenestra' small, not connected to tip (Figs 118H, I)

Female. Unknown.

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea gracillima Baehr & Harvey, sp. nov.
(Figs 119A–J, 120A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Hepburn Heights, site HH3 31.81722°S, 115.77027°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T121145, PBI_OON 23622). Allotype ♀: collected with holotype (WAM T121146, PBI_OON 23620).

Other material examined. AUSTRALIA: *Western Australia*: 5 ♂, Hepburn Heights, site HH3, 31.81722°S, 115.77027°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T84864, PBI_OON 18026).

Etymology. The specific name *gracillima* is a Latin adjective (feminine) meaning slender, slim and refers to the slim body shape of the species.

Diagnosis. Males resemble those of *O. duranti* in having scuto-pedicle region about 1/2 diameter of pedicle, paired ridges nearly straight, connected medially, postepigastric scutum with semicircular area of pores with thin setae between apodemes and palpal tip narrow with longitudinal prolateral ridge, but can be distinguished by flat carapace, the smaller and slender body shape, the postepigastric scutum with semicircular area of pores between apodemes, the spatulate bulbal tip and the narrow 'fenestra' covered with ridges (Fig. 119 I). Females can be separated from all other WA *Opopaea* species by the low scuto-pedicle region with about 1/2 diameter of pedicle (Fig. 120G).

Description. *Male* (PBI_OON 23622, Figs 119A–J). Total length 1.04. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow,

palpal patella orange brown. Carapace ovoid, pars cephalica flat in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides finely reticulate; lateral margin straight, rebordered, without denticles. Eyes, ALE: 0.065; PME: 0.052; PLE: 0.048, ALE largest, ALE circular, PME circular; posterior eye row straight from above; ALE separated by their radius to diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum with radial furrows between coxae I–II, II–III, III–IV, barely visible, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid; book lung covers large, ovoid; scuto-pedicle area about 1/2 diameter of pedicle, paired scutal ridges nearly straight, connected at middle; postepigastric scutum semicircular area of pores with thin setae between apodemes. Palpal patella 0.238 long, 0.139 wide, connection to femur at 0.53, bulb ventrally strongly bulging, tip spatulate, 'fenestra' narrow, margin covered with few ridges (Fig. 119 I).

Female (PBI_OON 23620, Figs 120A–G). Total length 1.30. Eyes, ALE: 0.055; PME: 0.049; PLE: 0.044. Epigastric area, ventral view, epigastric fold (EF) anterior margin straight, posterior margin widely triangular, with small knob; in dorsal view paddle-like sclerite (PSc) with arms bent at 2/3; nail-like process (Na) long conical; globular appendix (GAp) divided into hood and broad drop-shaped extension (Fig. 120G).

Distribution. This species is known only from the type locality, Hepburn Heights, in Western Australia.

Opopaea harmsi Baehr & Harvey, sp. nov.
(Figs 121A–J, 122A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Barrow Island, 20.78666°S, 115.45472°E, 17 May 2005, S. Callan (WAM T84442, PBI_OON 17804). Allotype ♀: same data as holotype except 6 May 2006, S. Callan, R. Graham (WAM T84420, PBI_OON 17782).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 1 ♀, Barrow Island, 20.78666°S, 115.45472°E, 6 May 2006, Curtin University staff

(WAM T84416, PBI_OON 17778); 1 ♀, same data (WAM T84418, PBI_OON 17780); 1 ♀, same data except S. Callan, R. Graham, 1 ♀ (WAM T84421, PBI_OON 17783); 1 ♀, same data except 17 May 2005, Curtin University staff (WAM T84443, PBI_OON 17805); 2 ♀, same data except 6 May 2006, Curtin University staff (WAM T84446, PBI_OON 17808); 1 ♀, same data (WAM T84447, PBI_OON 17809); 2 ♀, same data except 24 July 1992, W.F. Humphreys *et al.* (WAM T57519, PBI_OON 18056); 1 ♀, same data (WAM T57520, PBI_OON 18057); 1 ♂, same data except 1 May 2007, S. Callan (WAM T89208, PBI_OON 236030); 1 ♂, same data except 15 Mar. 2006, S. Callan, R. Graham (WAM T84448, PBI_OON 17810); 1 ♀, same data (WAM T84448, PBI_OON 17810); 1 ♀, same data except 24 July 1992, W.F. Humphreys *et al.* (WAM T57517, PBI_OON 18054); 1 ♀, same data except 1 May 2007, S. Callan, K. Edwards (WAM T89214, PBI_OON 23629); 1 ♂, same data (WAM T89208, PBI_OON 23630).

Etymology. This species is named for Danilo Harms for his contributions to Australian arachnology.

Diagnosis. Males and females resemble those of *O. pallida* in general body shape, scuto-pedicel region about diameter of pedicel and paired scutal ridges weak, not connected. Males similarly have the palpal tip narrow with prolateral ridge, but can be recognised by the more elongated palpal bulb and tip with semicircular ridge (prolateral view) (Fig. 121H). In females the epigastric area in ventral view has epigastric fold (EF) posterior margin straight with small median knob (Fig. 122F).

Description. *Male* (PBI_OON 17804, Figs 121A–J). Total length 1.32. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin rebordered, with blunt denticles. Eyes well developed, ALE: 0.062; PME: 0.062; PLE: 0.051, ALE, PME subequal, larger than PLE, ALE circular, PME squared; posterior eye row straight from above; ALE separated by less than their radius, ALE–PLE touching, PME touching throughout most of their length, PLE–PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, reduced; with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid; book lung covers large, ovoid; scuto-pedicel

region about diameter of pedicel, paired scutal ridges not connected. Palpal patella 0.253 long, 0.131 wide, connection to femur at 0.55; bulb ventrally strongly bulging, tip pointed with prolateral semicircular ridge, ‘fenestra’ small (Figs 121H, I).

Female (PBI_OON 17782, Figs 122A–G). Total length 1.69. Eyes, ALE: 0.065; PME: 0.065; PLE: 0.062. Epigastric area, ventral view, epigastric fold (EF) posterior margin straight with small median knob, small posterior concavity between lateral apodemes; in dorsal view paddle-like sclerite (PSc) with straight arms bent at 1/2 length, just reaching epigastric fold; nail-like process (Na) conical; globular appendix (GAp) mushroom-shaped (Fig. 122G).

Distribution. This species is known only from Barrow Island in Western Australia.

Opopaea johannae Baehr & Harvey, sp. nov.
(Figs 123A–J, 124A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 46 km NNE of Whim Creek Hotel, 20.47555°S, 117.99527°E, 9 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T82047, PBI_OON 4625). Allotype ♀: collected with holotype (WAM T121111, PBI_OON 19615).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, Barrow Island, 20.78666°S, 115.45472°E, 6 May 2006, S. Callan, R. Graham (WAM T84410, PBI_OON 17772); 1 ♀, same data (WAM T84417, PBI_OON 17779); 1 ♂, same data except 24–29 Apr. 2005, K. Edward, S. Callan (WAM T84444, PBI_OON 17806); 1 ♂, same data except 17–22 May 2005, S. Callan (WAM T84445, PBI_OON 17807); 1 ♂, same data except 25 Apr.–1 May 2007, K. Edward (WAM T89099, PBI_OON 23628); 12 ♂, 4 ♀, 1 km W. of Warehouse, 20.72860°S, 115.43220°E, 4 Nov.–3 Dec. 1993, M.S. Harvey, J.M. Waldo (WAM T57523, PBI_OON 18060); 1 ♂, same data except 4 Nov.–3 Dec. 1993, M.S. Harvey, J.M. Waldo (WAM T121131, PBI_OON 23622); 1 ♀, same data (WAM T121141, PBI_OON 23623); 8 ♂, 3 ♀, Bandicoot Bay, 20.86770°S, 115.33360°E, 4 Nov.–3 Dec. 1993, M.S. Harvey, J.M. Waldo (WAM T57518, PBI_OON 18055); 1 ♀, near Barge Landing, site QUBL2, 25 Aug.–1 Sept. 2004, K. Edward, L. Mould (WAM T7322.3, PBI_OON 18053); 19 ♂, 8 ♀, WAPET Camp, 20.82860°S, 115.44440°E, 5 Nov.–3 Dec. 1993, M.S. Harvey, J.M. Waldo (WAM T5752, 1, PBI_OON 18058); 1 ♂, 7 km SE of Marda Pool, 21.06972°S, 116.20666°E, 25 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82159, PBI_OON 5104); 6 ♂, 1 ♀, 46 km NNE of Whim Creek Hotel, 20.47555°S,

117.99527°E, 9 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T121112, PBI_OON 48259).

Etymology. The specific name is for Johanna Baehr, the daughter of the senior author who has helped collect and database goblin spiders for this project.

Diagnosis. Males and females resemble those of *O. millstream* in general body shape, having a finely reticulated carapace, scuto-pedichel region less than diameter of pedichel and paired scutal ridges short, not connected. In males the patella connection to femur at anterior half and the broad complex folded bulbal tip are also similar, but they can be distinguished by the triangular medially directed prolateral extension close to palpal tip (Fig. 123 I). In females the epigastric fold (EF) posterior margin is slightly bowed with median triangle (Fig. 124G).

Description. *Male* (PBI_OON 04625, Figs 123A–J). Total length 1.41. Prosoma, mouthparts and abdominal scutae pale orange, palp orange brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface finely reticulate; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.077; PME: 0.074; PLE: 0.066, ALE largest, ALE circular, PME circular; posterior eye row recurved from above; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME separated by less than their radius, PLE–PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, surface smooth. Abdomen, book lung covers large, ovoid; scuto-pedichel region less than diameter of pedichel, paired scutal ridges short, not connected; pedichel with small, dorsolateral, triangular extensions. Palpal patella 0.241 long, 0.137 wide, connection to femur at 0.56; bulb ventrally slightly bulging, with strong triangular medially directed prolateral extension close to palpal tip, tip broad with big prolateral ribbed fold bent distally, ‘fenestra’ large, close to tip (Fig. 123 I).

Female (PBI_OON 19615, Figs 124A–G). Total length 1.41. Eyes, ALE: 0.077; PME: 0.074; PLE: 0.066. Epigastric area, ventral view, epigastric

fold (EF) posterior margin slightly bowed with median triangle and two semicircular concavities on each side of triangle; in dorsal view paddle-like sclerite (PSc) with straight arms not reaching epigastric fold; nail-like process (Na) small conical; globular appendix (GAP) globular (Fig. 124G).

Distribution. This species is known from Barrow Island and the Pilbara in Western Australia.

Opopaea julianneae Baehr & Ott, sp. nov.
(Figs 125A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 9.5 km ESE of Marda Pool, 21.06305°S, 116.23500°E, 24 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82003, PBI_OON 04675).

Other material examined. AUSTRALIA: *Western Australia*: 6 ♂, 9.5 km ESE of Marda Pool, 21.06305°S, 116.23500°E, 24 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T121129, PBI_OON 48267); 1 ♂, 1.2 km SSE of Millstream, 21.60416°S, 117.07750°E, 14 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T82090, PBI_OON 5035).

Etymology. This species is named for Julianne Waldock of the Western Australian Museum who has collected many goblin spiders.

Diagnosis. Males resemble those of *O. rugosa* in general body shape and postepigastric scutum with longitudinal elevated ridge, covered with a line of slim plumose setae between lateral apodemes, but can be recognised by scuto-pedichel region about diameter of pedichel, paired scutal ridges touching and bulb ventrally slightly bulging, prolateral part of tip with small, ribbed, squared fold and small ‘fenestra’ (Fig. 125 I).

Description. *Male* (PBI_OON 4675, Figs 125A–J). Total length 1.48. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.076; PME: 0.084; PLE: 0.053, PME largest, ALE oval, PME squared; posterior eye row straight from above; ALE separated by their radius to diameter,

ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Sternum longer than wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits, surface smooth, with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid; book lung covers small, ovoid; scuto-pedicel region about diameter of pedicel, paired ridges nearly connected; postepigastric scutum anterior margin with longitudinal elevated ridge and line of fine plumose setae between lateral apodemes. Palpal patella 0.293 long, 0.157 wide, connection to femur at 0.57; bulb ventrally slightly bulging, prolateral part of tip with small, ribbed, squared fold and small 'fenestra' (Fig. 125 I).

Female. Unknown.

Distribution. This species is known from the Pilbara in Western Australia.

Opopaea marangaroo Baehr & Harvey, sp. nov.
(Figs 126A–J, 127A–H)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Marangaroo Reserve, site MR1, 31.83080°S, 115.83420°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T84871, PBI_OON 18033). Allotype ♀: collected with holotype (WAM T121150, PBI_OON 23637).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 1 ♀, Marangaroo Reserve, site MR1, 31.83080°S, 115.83420°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T121149, PBI_OON 23636).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males and females resemble those of *O. framenaui* in general body shape, scuto-pedicel area about diameter of pedicel and paired curved scutal ridges present, not connected at middle. Males similarly have the palpal cymbium separated by seam, but can be distinguished by the palpal patella connection to femur at 0.52, bulb dorsally with retrolaterally directed spike, tip broad, with a striated fanned patch and prolateral folds, 'fenestra' narrow (Fig. 126 I). In females, the epigastric area in dorsal view has paddle-like sclerite (PSc) with slightly bowed arms, not reaching epigastric fold (Fig. 127H).

Description. *Male* (PBI_OON 18033, Figs 126A–J). Total length 1.46. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.074; PME: 0.067; PLE: 0.046, ALE largest, ALE circular, PME oval; posterior eye row straight from above; ALE separated by less than their radius, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with row of large pits, surface smooth. Abdomen, book lung covers large, ovoid; scuto-pedicel area about diameter of pedicel, paired scutal ridges nearly straight, not connected at middle; postepigastric scutum with small area of pores with thin setae between apodemes. Palpal patella 0.295 long, 0.160 wide, connection to femur at 0.52; cymbium with a small patch of more slender plumose setae with acute tip, bulb ventrally strongly bulging, dorsally with retrolaterally directed spike, tip broad, with a striated fanned patch and prolateral folds, 'fenestra' narrow (Figs 126H, I).

Female (PBI_OON 23637, Figs 127A–H). Total length 1.55. Eyes, ALE: 0.059; PME: 0.057; PLE: 0.042. Epigastric area, ventral view, epigastric fold (EF) strongly bowed with tiny triangular middle part; in dorsal view paddle-like sclerite (PSc) with slightly bowed arms not reaching epigastric fold; nail-like process (Na) conical; globular appendix (GAp) tiny globular connected with strong triangular plate (Fig. 127H).

Distribution. This species is known only from the type locality in Western Australia.

Opopaea millstream Baehr & Harvey, sp. nov.
(Figs 128A–J, 129A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 1.2 km SSE of Millstream, 21.60416°S, 117.07750°E, 14 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T81936, PBI_OON 04630). Allotype ♀: collected with holotype (WAM T121107, PBI_OON 20193).

Other material examined. AUSTRALIA: *Western Australia*: 37 ♂, 35 ♀, 4 km N of Barowanna Hill, 21.39472°S, 117.17055°E, 17 July 2003–11 Oct. 2004, CALM Pilbara Survey (WAM T81913, PBI_OON 4566); 6 ♂, 7 ♀, 1.2 km SSE of Millstream, 21.60416°S, 117.07750°E, 14 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T121108, PBI_OON 20122).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. johannae* in general body shape, having a finely reticulated carapace, scuto-pedicel region less than diameter of pedicel, paired scutal ridges short, not connected, palpal patella connection to femur at anterior half and the broad complex folded bulbal tip, but can be distinguished by the cuticular prolateral fold at the middle of the palpal bulb (Fig. 128 I). In females the epigastric fold (EF) posterior margin has a small median knob.

Description. *Male* (PBI_OON 04630, Figs 128A–J). Total length 1.33. Prosoma, mouthparts and abdominal scutae pale orange, palp orange brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface finely reticulate; lateral margin straight, rebordered, without denticles. Eyes, ALE: 0.075; PME: 0.071; PLE: 0.060, ALE largest, ALE circular, PME circular; posterior eye row recurved from above; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, surface smooth, infra-coxal grooves weak. Abdomen ovoid; book lung covers large, ovoid; scuto-pedicel region less than diameter of pedicel, paired scutal ridges short, not connected; pedicel with small, dorsolateral, triangular extensions. Palpal patella 0.232 long, 0.140 wide, connection to femur at 0.53; bulb ventrally slightly bulging, with deep prolateral fold at the middle of the bulb, tip broad with long prolateral ribbed fold bent distally, ‘fenestra’ close to tip (Figs 128H, I).

Female (PBI_OON 20193, Figs 129A–G). Total length 1.55. Eyes, ALE: 0.069; PME: 0.063; PLE: 0.055. Epigastric area, ventral view, epigastric

fold (EF) slightly bowed with triangular middle part and two semicircular concavities on each side of triangle (Fig. 129F); in dorsal view paddle-like sclerite (PSc) with straight arms bent at the end, not reaching epigastric fold; nail-like process (Na) narrow conical; globular appendix (GA) globular (Fig. 129G).

Distribution. This species is known from the Pilbara in Western Australia.

Opopaea nadineae Baehr & Harvey, sp. nov.
(Figs 130A–J, 131A–H)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 32 km E of Port Hedland, 20.32444°S, 118.92222°E, 25 July 2005–25 Aug. 2006, CALM Pilbara Survey (WAM T82025, PBI_OON 04700). Allotype ♀: 32 km E of Port Hedland, 20.32444°S, 118.92222°E, 25 July 2005–25 Aug. 2006, CALM Pilbara Survey (WAM T121135, PBI_OON 48269).

Other material examined. AUSTRALIA: *Western Australia*: 3 ♂, 5 ♀, 32 km E of Port Hedland, 20.32444°S, 118.92222°E, 25 July 2005–25 Aug. 2006, CALM Pilbara Survey (WAM T121139, PBI_OON 48269); 2 ♂, 6 ♀, 45 km NE of Whim Creek Hotel, 20.60722°S, 118.15638°E, 7 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T82024, PBI_OON 4699).

Etymology. This species is named for Nadine Guthrie, who collected and sorted many of the Pilbara Survey spiders.

Diagnosis. Males resemble those of *O. triangularis* in having scuto-pedicel region about diameter of pedicel, paired scutal ridges connected by arc, an elevated triangle of ridges between lateral apodemes, patella connection to femur at anterior half and a strong prolateral spine at the bulbal base, but can be distinguished by the broadly oval and posteriorly pointed abdomen and the wider triangle between lateral apodemes (Fig. 130C). In females the epigastric fold (EF) posterior margin is slightly bowed with narrow median triangle (Fig. 131D).

Description. *Male* (PBI_OON 04700, Figs 130A–J). Total length 1.18. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides

striated; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.049; PME: 0.068; PLE: 0.044, PME largest, ALE circular, PME squared; posterior eye row straight from above; ALE separated by more than their diameter, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Abdomen broadly oval, pointed posteriorly; book lung covers small, ovoid; scuto-pedicel region less than diameter of pedicel, paired curved ridges connected medially by arc (Fig. 130F); anterior margin of postepigastric scutum with wide, elevated triangle of ridges between apodemes (Fig. 130C). Palpal patella 0.278 long, 0.138 wide, connection to femur at 0.55; bulb ventrally strongly bulging with strong prolateral spine, tip spatulate with narrow prolateral incision and longitudinal ridge, 'fenestra' small (Figs 130H, I).

Female (PBI_OON 48269). Total length 1.18. Eyes, ALE: 0.053; PME: 0.069; PLE: 0.040. Epigastric area, ventral view, epigastric fold (EF) posterior margin slightly bowed with narrow median triangle (Fig. 131G) and semicircular concavities on each side of triangle; in dorsal view paddle-like sclerite (PSc) with straight arms bent at 2/3 length, just reaching epigastric fold; nail-like process (Na) narrow conical; globular appendix (GAp) globular (Fig. 131H).

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea pallida Baehr & Harvey, sp. nov.
(Figs 132A–J, 133A–G)

Material examined. Holotype ♂: AUSTRALIA: Western Australia: 45 km NE of Whim Creek Hotel, 20.60722°S, 118.15638°E, 7 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T121137, PBI_OON 04598). Allotype ♀: collected with holotype (WAM T121138, PBI_OON 23679).

Other material examined. AUSTRALIA: Western Australia: 2 ♀, 8 km SSW of Dresser Mining Centre, 21.21805°S, 119.40194°E, 12 Oct. 2005–18 Aug. 2006, CALM Pilbara Survey (WAM T81965, PBI_OON 4634); 1 ♂, 3 ♀, 5.5 km NE of Giles Point, 23.21333°S, 119.20222°E, 30 Aug. 2003–19 Oct. 2004, CALM Pilbara Survey (WAM T81997, PBI_OON 4669); 2 ♀, 10 km S of Mallina Homestead, 20.96944°S, 118.04833°E, 11 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T81957, PBI_OON 4600); 1 ♀, 7 km SE of Marda Pool, 21.06972°S, 116.20666°E, 25 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM

T81946, PBI_OON 4588); 1 ♂, same data (WAM T82103, PBI_OON 5048); 2 ♂, 2 ♀, 9.5 km ESE of Marda Pool, 21.06305°S, 116.23500°E, 24 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T81984, PBI_OON 4656); 1 ♀, 10 km E of Meentheena Outcamp, 21.24611°S, 120.53888°E, 1 Aug. 2003–13 Oct. 2004, CALM Pilbara Survey (WAM T81961, PBI_OON 4604); 1 ♂, 1 ♀, same data (WAM T81967, PBI_OON 4636); 5 ♂, 3 ♀, 10.5 km NW of Mt Berry, 22.41055°S, 116.39166°E, 10 Sept. 2003–9 Oct. 2004, CALM Pilbara Survey (WAM T82009, PBI_OON 4682); 2 ♂, 19.7 km WNW of Mt Berry, 22.43750°S, 116.27416°E, 8 Sept. 2003–10 Oct. 2004, CALM Pilbara Survey (WAM T82071, PBI_OON 4038); 11 ♂, 11 ♀, 7.5 km NNW of Mt Berry, 22.42472°S, 116.43250°E, 10 Sept. 2003–19 Oct. 2004, CALM Pilbara Survey (WAM T82020, PBI_OON 4693); 5 ♂, 15 ♀, 10.5 km W of Mt De Courcy, 22.71111°S, 116.40027°E, 7 Sept. 2003–11 Oct. 2004, CALM Pilbara Survey (WAM T81943, PBI_OON 4585); 4 ♂, 3 ♀, 27 km ESE of Mt De Courcy, 22.78916°S, 116.57083°E, 7 Sept. 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T82001, PBI_OON 4673); 4 ♀, 1 km SW of Mt Florance Homestead, 21.79500°S, 117.85694°E, 6 May 2004–18 May 2005, CALM Pilbara Survey (WAM T81949, PBI_OON 4592); 1 ♀, 0.2 km N of Mt Florance Homestead, 21.78666°S, 117.86194°E, 3 Sept. 2003–10 Oct. 2004, CALM Pilbara Survey (WAM T81952, PBI_OON 4595); 3 ♂, 3 ♀, 7 km SSE of Mt Minnie, 22.16944°S, 115.56083°E, 27 Sept. 2003–30 Sept. 2004, CALM Pilbara Survey (WAM T81982, PBI_OON 4654); 1 ♂, 24 km NNE of Nullagine, 21.67722°S, 120.15527°E, 4 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T82053, PBI_OON 4017); 2 ♀, same data (WAM T81956, PBI_OON 4599); 1 ♂, same data (WAM T121114, PBI_OON 20196); 1 ♀, 42.5 km N of Nullagine, 21.49916°S, 120.10888°E, 3 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T82012, PBI_OON 4685); 1 ♀, 12.5 km E of Pannawonica, 21.62722°S, 116.44583°E, 2 Oct. 2005–27 Sept. 2006, CALM Pilbara Survey (WAM T81944, PBI_OON 4586); 1 ♂, 37.5 km SE of Paraburdoo, 23.37305°S, 117.98972°E, 29 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T82014, PBI_OON 4687); 1 ♂, 5 km WSW of Python Pool, 21.34111°S, 117.18833°E, 8 May 2003–12 May 2005, CALM Pilbara Survey (WAM T121119, PBI_OON 48261); 1 ♀, 11.5 km SW of Rhodes Ridge, 23.14583°S, 119.26555°E, 25 May 2004–11 May 2005, CALM Pilbara Survey (WAM T82000, PBI_OON 4672); 4 ♂, 5 ♀, 6 km SW of Roy Hill Station, 22.66083°S, 119.91861°E, 9 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T81987, PBI_OON 4659); 1 ♀, 32.5 km WSW of Tom Price, 22.79750°S, 117.49444°E, 26 Aug. 2005–22 Sept. 2006, CALM Pilbara Survey (WAM T81981, PBI_OON 4652); 1 ♀, 6 km ENE of Tom Price, 22.68000°S, 117.84777°E, 3 Aug. 2005–18 Sept. 2006, CALM Pilbara Survey (WAM T81999, PBI_OON 4671); 1 ♂, 2 ♀, 23 km NE of Warrawagine Homestead, 20.69833°S, 120.85638°E, 1 July 2005–21 Aug. 2006, CALM Pilbara Survey (WAM T81975,

PBI_OON 4645); 1 ♂, 1 ♀, 11 km NE of Weeli Wolli Spring, 22.83722°S, 119.27111°E, 30 Aug. 2003–16 Oct. 2004 CALM Pilbara Survey (WAM T82013, PBI_OON 4686); 2 ♂, 1 ♀, 10 km SSE of Wheelarra Hill, 23.45833°S, 120.15583°E, 7 Sept. 2005–10 Aug. 2006, CALM Pilbara Survey (WAM T82016, PBI_OON 4689); 1 ♂, 2 ♀, 33.5 km E of Wheelarra, 23.37250°S, 120.45805°E, 4 Sept. 2005–11 Aug. 2006, CALM Pilbara Survey (WAM T81963, PBI_OON 4606); 2 ♂, 11 km SSE of Whim Creek Hotel, 20.91972°S, 117.86111°E, July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82034, PBI_OON 4709); 5 ♀, same data (WAM T82035, PBI_OON 4710); 2 ♀, 12.5 km S of Whim Creek Hotel, 20.94972°S, 117.84972°E, 13 May 2004–2 May 2005, CALM Pilbara Survey (WAM T81947, PBI_OON 4590); 2 ♀, 20 km ESE of Whim Creek Hotel, 20.91000°S, 117.98277°E, 10 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T81968, PBI_OON 4637); 1 ♀, 45 km NE of Whim Creek Hotel, 20.60722°S, 118.15638°E, 7 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T81950, PBI_OON 4593); 17 ♂, 6 ♀, same data (WAM T81955, PBI_OON 23680); 6 ♂, 1 ♀, 46 km NNE of Whim Creek Hotel, 20.47555°S, 117.99527°E, 9 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T81971, PBI_OON 4640); 2 ♀, 11 km N of Wodgina, 21.07166°S, 118.67972°E, 23 Sept. 2005–13 Sept. 2006, CALM Pilbara Survey (WAM T81966, PBI_OON 4635); 1 ♀, 32.5 km SSE of Wodgina, 21.45833°S, 118.72583°E, 23 Sept. 2005–14 Sept. 2006, CALM Pilbara Survey (WAM T81985, PBI_OON 4657); 1 ♂, 1 ♀, 5 km NNE of Wodgina, 21.12805°S, 118.68944°E, 23 Sept. 2005–13 Sept. 2006, CALM Pilbara Survey (WAM T81959, PBI_OON 4602).

Etymology. The specific name *pallida* is a Latin adjective (feminine) meaning pale and refers to the pale body color of this species.

Diagnosis. Males resemble those of *O. harmsi* in general body shape, scuto-pedicel region about diameter of pedicel, paired scutal ridges weak, not connected and palpal tip narrow with prolateral ridge, but can be recognised by the more compact bulb and tip with s-shaped ridge (prolateral view) and larger 'fenestra' (Fig. 132A). In females the epigastric area in ventral view has epigastric fold (EF) posterior margin slightly bowed with wide rounded triangular middle part and small concavity just behind triangle (Fig. 133F).

Description. *Male* (PBI_OON 4598, Figs 132A–J). Total length 1.23. Prosoma, mouthparts and abdominal scutae pale orange, legs yellow; palpal patella orange-brown. Carapace ovoid, pars cephalica slightly elevated, with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated;

lateral margin rebordered, without denticles. Eyes, ALE: 0.069; PME: 0.070; PLE: 0.055, PME largest, ALE circular, PME squared; posterior eye row recurved from above; ALE separated by less than their radius, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum longer than wide, with radial furrows between coxae I–II, II–III, III–IV, reduced, surface smooth, with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid; book lung covers large, ovoid; scuto-pedicel region about diameter of pedicel, paired scutal ridges weak, not connected. Palpal patella 0.246 long, 0.140 wide, connection to femur at 0.60; bulb compact, ventrally strongly bulging, tip narrow with longitudinal prolateral s-shaped ridge and large 'fenestra'.

Female (PBI_OON 23679, Fig. 133A–G). Total length 1.27. Eyes, ALE: 0.064; PME: 0.065; PLE: 0.052. Epigastric area, ventral view, epigastric fold (EF) posterior margin slightly bowed with wide rounded triangular middle part and small concavity just behind triangle; in dorsal view paddle-like sclerite (PSc) with straight arms bent at 2/3 length (Fig. 133G), just reaching epigastric fold; nail-like process (Na) broad conical; globular appendix (GAp) globular.

Distribution. This species is widespread in the Pilbara of Western Australia.

Opopaea pannawonica Baehr & Ott, sp. nov.
(Figs 134A–J, 135A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 7 km ENE of Pannawonica, 21.62194°S, 116.38972°E, 2 Oct. 2005–27 Sept. 2006, CALM Pilbara Survey (WAM T82049, PBI_OON 04632). Allotype ♀: collected with holotype (WAM T121109, PBI_OON 23616).

Other material examined. AUSTRALIA: *Western Australia*: 4 ♂, 1 ♀, 24.5 km N of Cowra Line Camp, 22.13444°S, 119.02416°E, 27 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T82081, PBI_OON 5026); 3 ♂, 1 ♀, 12 km NE of Mile Camp, 22.70722°S, 119.70916°E, 10 Aug. 2003–21 Oct. 2004, CALM Pilbara Survey (WAM T81969, PBI_OON 4638); 1 ♂, 7 km SSE of Mt Minnie, 22.16944°S, 115.56083°E, 27 Sept. 2003–30 Sept. 2004, CALM Pilbara Survey (WAM T121132, PBI_OON 48268); 1 ♂, 7 km ENE of Pannawonica, 21.62194°S, 116.38972°E, 2 Oct. 2005–27 Sept. 2006, CALM Pilbara Survey (WAM T121110, PBI_OON 23618).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. pilbara* in general body shape and in having scuto-pedicle region about diameter of pedicle, paired scutal ridges connected by arc, postepigastric scutum with concavity between lateral apodemes, but can be recognised by the smaller eyes, palpal patella connection to femur 0.56; bulb ventrally slightly bulging, tip prolaterally spatulate, with striated ridge and wide incision, 'fenestra' small, opposite incision (Fig. 134 I). In females the epigastric area in dorsal view has paddle-like sclerite (PSc) arms slightly bowed, not reaching epigastric fold (Fig. 135G).

Description. *Male* (PBI_OON 04632, Figs 134A–J). Total length 1.43. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace broadly oval, pars cephalica slightly elevated in lateral view, with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.054; PME: 0.059; PLE: 0.044, PME largest, ALE circular, PME oval; posterior eye row straight from above; ALE separated by their radius to diameter, ALE-PLE touching, PME touching for less than half their length, PLE-PME touching. Sternum as long as wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits, surface smooth. Abdomen ovoid, rounded posteriorly; book lung covers small, ovoid; scuto-pedicle region about diameter of pedicle, paired scutal ridges connected by arc; postepigastric scutum with concavity between lateral apodemes. Palpal patella 0.296 long, 0.164 wide, connection to femur at 0.56; bulb ventrally slightly bulging, tip prolaterally spatulate, with striated ridge, and wide incision, 'fenestra' small, opposite incision (Figs 134H, I).

Female (PBI_OON 23616, Figs 135A–G). Total length 1.69. Eyes, ALE: 0.051; PME: 0.052; PLE: 0.041; ALE-PLE separated by less than ALE radius, PLE-PME separated by less than PME radius. Epigastric area, ventral view, epigastric fold (EF) slightly bowed with narrow triangular middle

part; in dorsal view paddle-like sclerite (PSc) arms slightly bowed, not reaching epigastric fold (Fig. 135G); nail-like process (Na) conical; globular appendix (GAp) globular.

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea phineus Harvey & Edward

Opopaea phineus Harvey and Edward, 2007: 12–14, figs 6–8.

Material examined. Holotype ♀: AUSTRALIA: Western Australia: cave KNI-27, Ningbing Range, 15°17'S, 128°41'E, 16 May 1994, R.D. Brooks (WAM T65943).

Diagnosis. *Opopaea phineus* and *O. ectognophus* are the only fully blind species of the genus currently known. *Opopaea phineus* differs from *O. ectognophus* by being significantly larger (total length 1.50 versus 1.12), the dorsal abdominal scute covers all of the opisthosoma (only partially covers the opisthosoma in *O. ectognophus*), the shape of the carapace in which the postero-lateral margins of *O. phineus* are more angulate than in *O. ectognophus*, and the sternum of *O. phineus* bears apodemes leading away from coxae II–IV which are absent in *O. ectognophus*.

Description. *Male*. Unknown.

Female. See (Harvey & Edward 2007).

Distribution. This species is known only from a single cave in the Kimberley region of Western Australia.

Opopaea pilbara Baehr & Ott, sp. nov. (Figs 136A–J, 137A–G)

Material examined. Holotype ♂: AUSTRALIA: Western Australia: Tom Price, 32.5 km WSW, 22.79750°S, 117.49444°E, 26 Aug. 2005–22 Sept. 2006, CALM Pilbara Survey (WAM T81875, PBI_OON 04384). Allotype ♀: collected with holotype (WAM T121136, PBI_OON 23610).

Other material examined. AUSTRALIA: Western Australia: 2 ♂, 5 ♀, 32.5 km WSW of Tom Price, 22.79750°S, 117.49444°E, 26 Aug. 2005–22 Sept. 2006, CALM Pilbara Survey (WAM T121115, PBI_OON 23611; 1 ♂, 46 km NNE of Whim Creek Hotel, 20.47555°S, 117.99527°E, 9 July 2003–4 Oct. 2004, CALM Pilbara Survey (WAM T81870, PBI_OON 4492).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. wheelarria* in general body shape and in having scuto-pedicle region about diameter of pedicle, paired scutal ridges connected by arc, area between anterior and posterior spiracles slightly concave and dotted but no setae, but can be recognised by smaller eyes, palpal patella connection to femur at 0.53; bulb more compact, ventrally slightly bulging, tip prolaterally incised, spatulate, bent medially with striated ridge, 'fenestra' small, opposite incision (Fig. 136 I). Females have epigastric fold (EF) anterior margin straight with small knob, posterior margin with 2 large chitinized edges (Fig. 137G).

Description. *Male* (PBI_OON 04384, Figs 136A–J). Total length 1.87. Prosoma, mouthparts and abdominal scutae orange brown, legs pale orange. Carapace broadly oval, pars cephalica strongly elevated in lateral view, with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides reticulated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.078; PME: 0.079; PLE: 0.072, PME largest, ALE circular, PME circular; posterior eye row recurved from above; ALE separated by more than their diameter, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum as long as wide, with wide radial furrows, with rows of small pits, posterior margin reticulated, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid; book lung covers large, ovoid; scuto-pedicle region about diameter of pedicle, paired scutal ridges connected by arc, pedicle with plumose setae laterally. Palpal patella 0.380 long, 0.194 wide, connection to femur at 0.53; bulb ventrally slightly bulging, tip prolaterally incised, spatulate, bent medially with striated ridge, 'fenestra' small, opposite incision (Fig. 136 I).

Female (PBI_OON 23610, Figs 137A–G). Total length 2.04. Eyes, ALE: 0.081; PME: 0.077; PLE: 0.071, ALE largest. Epigastric area, ventral view, epigastric fold (EF) anterior margin straight with small knob, posterior margin with 2 large

chitinized edges; in dorsal view paddle-like sclerite (PSc) with straight arms bent at 2/3, reaching epigastric fold; nail-like process (Na) narrow conical; globular appendix (GAP) with long narrow extension (Figs 137F, G).

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea rixi Baehr & Harvey, sp. nov.
(Figs 138A–J, 139A–H)

Material examined. Holotype ♂: AUSTRALIA: Western Australia: Hepburn Heights, site HH4, 31.81583°S, 115.77805°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T121126, PBI_OON 23633). Allotype ♀: collected with holotype (WAM T121147, PBI_OON 23634).

Other material examined. AUSTRALIA: Western Australia: 5 ♂, 8 ♀, Hepburn Heights, site HH4, 31.81583°S, 115.77805°E, 25 Sept.–28 Nov. 1995, M. Harvey, J. Waldock (WAM T84869, PBI_OON 18031); 3 ♂, 10 ♀, 13 July–25 Sept. 1995, M. Harvey, J. Waldock (WAM T84870, PBI_OON 18032).

Etymology. The specific name honors Michael Rix, in recognition of his contributions to arachnology.

Diagnosis. Males resemble those of *O. callani* in general body shape, having scuto-pedicle area less than diameter of pedicle, paired scutal ridges not connected at middle and postepigastric scutum with concavity between lateral apodemes, but can be distinguished by bulb with shorter tip and not retrolaterally bulging at height of narrow 'fenestra' (Fig. 138 I). Females can be separated from all other WA species by the scuto-pedicle region being about ¾ of diameter of pedicle, carapace top smooth and sides striated.

Description. *Male* (PBI_OON 23623, Figs 138A–J). Total length 1.50. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace ovoid with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.066; PME: 0.070; PLE: 0.055, PME largest, ALE circular, PME oval; posterior eye row recurved from above; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching for less than half their length,

PLE-PME separated by less than PME radius. Sternum longer than wide, with weak radial furrows between coxae I-II, II-III, III-IV, furrow with row of small pits, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid, rounded posteriorly; book lung covers large, ovoid; scuto-pediceal region about diameter of pediceal, paired scutal ridges weak, not connected; postepigastric scutum between lateral apodemes slightly concave. Palpal patella 0.282 long, 0.149 wide, connection to femur at 0.56; bulb ventrally strongly bulging, tip narrow with small prolateral incision, 'fenestra' small (Figs 138H, I).

Female (PBI_OON 23634). Total length 1.57. Eyes, ALE: 0.073; PME: 0.061; PLE: 0.052, ALE largest. Epigastric area, ventral view, epigastric fold (EF) slightly bowed with triangular middle part and small posterior concavity between lateral apodemes; in dorsal view paddle-like sclerite (PSc) with straight arms bent at 2/3 length, reaching epigastric fold (Fig. 139 I); nail-like process (Na) broad conical; globular appendix (GAp) globular.

Distribution. This species is known only from Hepburn Heights in Western Australia.

Opopaea robusta Baehr & Ott, sp. nov.
(Figs 140A-J, 141A-G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 5 km WSW of Python Pool, 21.34111°S, 117.18833°E, 8 May 2004–12 May 2005, CALM Pilbara Survey (WAM T81872, PBI_OON 04501). Allotype ♀: collected with holotype (WAM T121121, PBI_OON 48262).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, Barrow Island, Chevron Texaco Camp, 20.82861°S, 115.44333°E, 17 May 2005, S. Callan (WAM T84414, PBI_OON 17776); 1 ♂, 1 ♀, Barrow Island, near Terminal Tank along pipeline road, site TLN12, 20.77806°S, 115.45527°E, 20 Nov. 2003, R. Teale, G. Harold (WAM T57726, PBI_OON 23627); 1 ♂, same data (WAM T121143, PBI_OON 23626); 1 ♀, 7 km SE of Marda Pool, 21.06972°S, 116.20666°E, 25 Sept. 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T81871, PBI_OON 4493); 1 ♀, 1.2 km SSE of Millstream, 21.60416°S, 117.07750°E, 14 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T81869, PBI_OON 4491); 1 ♀, 12 km ESE of Mt Billroth, 21.66250°S, 117.70472°E, 5 May 2004–18 May 2005, CALM Pilbara Survey (WAM T121124, PBI_OON 48265); 1 ♀, 46 km NNE of Whim Creek Hotel, 20.47555°S, 117.99527°E, 9 July 2003–4 Oct.

2004, CALM Pilbara Survey (WAM T81870, PBI_OON 4492); 1 ♂, 20 km ENE of Wodgina, 21.11472°S, 118.85166°E, 23 Sept. 2005–13 Sept. 2006, CALM Pilbara Survey (WAM T82150, PBI_OON 5095).

Etymology. The specific name *robusta* is a Latin adjective (feminine) meaning firm or solid, in reference to the well built body shape of this species.

Diagnosis. Males and females resemble none of the WA species but are similar to *O. martini* from New South Wales in having PME largest, a high shouldered carapace and scuto-pediceal region high, about 1 ½ diameter of pediceal, without scutal ridges and pediceal without triangular lateral extensions. Males can be distinguished by the bulb ventrally slightly bulging, tip prolaterally spatulate with striated ridge and small incision, 'fenestra' opposite incision (Fig. 140 I). Females can be separated by the epigastric area in ventral view having epigastric fold (EF) widely triangular with small concavity and two chitinized edges (Figs 141F, G).

Description. *Male* (PBI_OON 04501, Figs 140A-J). Total length 1.49. Prosoma, mouthparts and abdominal scutae and legs orange brown. Carapace broadly oval, with strong stout setae, pars cephalica strongly elevated in lateral view, with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin straight, rebordered, without denticles. Eyes, ALE: 0.071; PME: 0.085; PLE: 0.059, PME largest, ALE oval, PME squared; posterior eye row straight from above; ALE touching, ALE-PLE touching, PME touching throughout most of their length, PLE-PME touching. Sternum as long as wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings. Abdomen globular, pointed posteriorly; book lung covers small, ovoid; scuto-pediceal region high, about 1 ½ diameter of pediceal, without scutal ridges and pediceal without triangular lateral extensions (Fig. 140G). Palpal patella 0.317 long, 0.164 wide, connection to femur at 0.56; bulb ventrally slightly bulging, tip prolaterally spatulate with striated ridge and small incision, 'fenestra' opposite incision (Figs 140 I-J).

Female (PBI_OON 48262, Figs 141A–G). Total length 1.78. Eyes, ALE: 0.074; PME: 0.074; PLE: 0.059, ALE, PME subequal, larger than PLE. Epigastric area, ventral view, epigastric fold (EF) widely triangular with small concavity and two chitinated edges; in dorsal view paddle-like sclerite (PSc) with slightly bowed arms bent at 2/3 length, just reaching epigastric fold; nail-like process (Na) broad conical; globular appendix (GAp) globular with tiny narrow extension (Figs 141F, G).

Distribution. This species is known from Barrow Island and the Pilbara in Western Australia.

Opopaea rugosa Baehr & Ott, sp. nov.
(Figs 142A–J, 143A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: Barrow Island, 1 km W. of Warehouse, 20.72860°S, 115.43220°E, 4 Nov.–3 Dec. 1993, M.S. Harvey, J.M. Waldock (WAM T57552, PBI_OON 18059). Allotype ♀: collected with holotype (WAM T121142, PBI_OON 48272).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♀, Barrow Island, old air strip, 20.75000°S, 115.38333°E, 1 May–6 May 2006, S. Callan, R. Graham (WAM T84413, PBI_OON 17775); 1 ♂, 10 km SSW of Dresser Mining Center, site MBE11, 21.23666°S, 119.40833°E, 12 Oct. 2005–18 Aug. 2006, CALM Pilbara Survey (WAM T121122, PBI_OON 48263).

Etymology. The specific name *rugosa* is a Latin adjective (feminine) meaning full of wrinkles which refers to the wrinkled body cuticle of this species.

Diagnosis. Males resemble those of *O. julianneae* in general body shape and postepigastric scutum with longitudinal elevated ridge, covered with a line of slim plumose setae between lateral apodemes, but can be easily recognised by the high shouldered carapace, scuto-pediceal region more than diameter of pedicel, paired scutal ridges not connected and bulb ventrally strongly bulging, tip with ventral crest and deep prolateral incision, 'fenestra' large (Figs 142H, I). Females can be separated from all other WA species by the globular appendix (GAp) having a long narrow extension (Fig. 143G).

Description. *Male* (PBI_OON 18059, Figs 142A–J). Total length 1.44. Prosoma, mouthparts and abdominal scutae orange brown, legs pale orange. Carapace broadly oval, high shouldered

with angular posterolateral corners, surface of elevated portion of pars cephalica granulate, sides striated; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.084; PME: 0.070; PLE: 0.054, ALE largest, ALE circular, PME circular; posterior eye row recurved from above; ALE separated by less than their radius, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum as long as wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, surface rugose, covered with small round pits, microsculpture covering entire surface, lateral margin with infra-coxal grooves and anterior and posterior openings. Abdomen ovoid, pointed posteriorly; book lung covers small, ovoid; scuto-pediceal region more than diameter of pedicel, paired scutal ridges not connected; postepigastric scutum with longitudinal elevated ridge, covered with a line of slim plumose setae between lateral apodemes. Palpal patella 0.281 long, 0.159 wide, connection to femur at 0.53; bulb ventrally strongly bulging, tip with ventral crest and deep prolateral incision, 'fenestra' large (Figs 142 H–J).

Female (PBI_OON 48272, Figs 143A–G). Total length 1.58. Eyes, ALE: 0.078; PME: 0.066; PLE: 0.059. Epigastric area, ventral view, epigastric fold (EF) widely triangular; in dorsal view paddle-like sclerite (PSc) with slightly bowed arms reaching epigastric fold; nail-like process (Na) broad conical; globular appendix (GAp) globular with long narrow extension (Fig. 143G).

Distribution. This species is known from Barrow Island and the Pilbara in Western Australia.

Opopaea subtilis Baehr & Harvey, sp. nov.
(Figs 144A–J)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 5.5 km NE of Giles Point, 23.21333°S, 119.20222°E, 30 Aug. 2003–19 Oct. 2004, CALM Pilbara Survey (WAM T82057, PBI_OON 04022).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 5.5 km NE of Giles Point, 23.21333°S, 119.20222°E, 30 Aug. 2003–19 Oct. 2004, CALM Pilbara Survey (WAM T121123, PBI_OON 48264).

Etymology. The specific name *subtilis* is a Latin adjective (feminine) meaning slender, delicate, referring to the delicate body form of the species.

Diagnosis. Males resemble those of *O. exoculata* in general body shape, having reduced eyes, scuto-pedicel area less than 1/2 diameter of pedicel, paired scutal ridges absent and sternum distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV, but can be distinguished by the short, thin, medially bent bulbal tip without longitudinal ridge (Fig. 144 I).

Description. *Male* (PBI_OON 04031, Figs 144A–J). Total length 1.09. Prosoma, mouthparts and abdominal scutae yellow, legs white, palps orange brown. Carapace elongate, pars cephalica flat in lateral view, with rounded posterolateral corners, surface smooth; lateral margin undulate, rebordered, without denticles. Eyes reduced, tiny, ALE: 0.031; PME: 0.035; PLE: 0.022, PME largest, ALE circular, PME circular; posterior eye row recurved from above; ALE separated by more than their diameter, ALE-PLE separated by less than ALE radius, PME touching for less than half their length, PLE-PME touching. Sternum longer than wide, without radial furrows between coxae I–II, II–III, III–IV, surface smooth; distance between coxae II and III greater than distance between coxae I and II, and coxae III and IV. Abdomen, book lung covers large, ovoid, darkened; scuto-pedicel region less than 1/2 diameter of pedicel, paired scutal ridges absent, pedicel tube without extensions. Palpal patella 0.230 long, 0.111 wide, connection to femur at 0.50; bulb ventrally slightly bulging, tip with short, thin, medially bent tip, ‘fenestra’ small (Fig. 144 I).

Female. Unknown.

Distribution. This species is known only from Giles Point in the Pilbara, Western Australia.

Opopaea triangularis Baehr & Harvey, sp. nov.
(Figs 145A–J, 146A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 11 km ESE of Marda Pool, 21.05555°S, 116.25166°E, 24 Sept. 2003–2 Oct. 2004, CALM Pilbara Survey (WAM T82023, PBI_OON 04698). Allotype ♀: collected with holotype (WAM T121125, PBI_OON 23619).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 21 km WNW of Bonney Downs Homestead, 22.09472°S, 119.75333°E, 7 Aug. 2003–18 Oct. 2004, CALM Pilbara Survey (WAM T121140, PBI_OON 48271); 2 ♂, 34 km NNW of Cowra Line Camp, site RHNW09, 22.06861°S, 118.97861°E, 26 Aug. 2003–20 Oct. 2004, CALM Pilbara Survey (WAM T82043, PBI_OON 4718); 1 ♂, 9 km NW of Lake Poongkaliyarra, 20.93972°S, 117.03472°E, 3 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T82033, PBI_OON 4708); 1 ♂, 11 km ESE of Marda Pool, 21.05555°S, 116.25166°E, 24 Sept. 2003–2 Oct. 2004, CALM Pilbara Survey (WAM T121144, PBI_OON 23631); 1 ♂, 10 km E of Meentheena Outcamp, 21.24611°S, 120.53888°E, 1 Aug. 2003–13 Oct. 2004, CALM Pilbara Survey (WAM T82027, PBI_OON 4702); 2 ♂, same data (WAM T82046, PBI_OON 4722); 1 ♂, 14 km E of Meentheena Outcamp, 21.27138°S, 120.58500°E, 1 Aug. 2003–13 Oct. 2004, CALM Pilbara Survey (WAM T82026, PBI_OON 4701); 2 ♂, 32.5 km ESE of Meentheena Outcamp, 21.33361°S, 120.75222°E, 31 July 2003–13 Oct. 2004, CALM Pilbara Survey (WAM T82036, PBI_OON 4711); 1 ♂, 58 km ESE of Meentheena Outcamp, 21.32194°S, 121.00222°E, 30 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T82042, PBI_OON 4717); 2 ♂, 78 km E of Meentheena Outcamp, 21.30416°S, 121.20027°E, 29 July 2003–12 Oct. 2004, CALM Pilbara Survey (WAM T82037, PBI_OON 4712); 4 ♂, 4 ♀, 83 km E of Meentheena Outcamp, 21.28833°S, 121.23722°E, 29 July 2003–11 Oct. 2004, CALM Pilbara Survey (WAM T82038, PBI_OON 4713); 1 ♂, 1 km SE of Mt Murray, 22.49833°S, 115.55805°E, 29 Sept. 2003–1 Oct. 2004, CALM Pilbara Survey (WAM T82029, PBI_OON 4704); 1 ♂, 45 km N of Nullagine, 21.47972°S, 120.09055°E, 19 May 2004–18 May 2005, CALM Pilbara Survey (WAM T82032, PBI_OON 4707); 1 ♂, 11 km SW of Warrawagine Homestead, 20.91694°S, 120.62416°E, 3 July 2005–20 Aug. 2006, CALM Pilbara Survey (WAM T82040, PBI_OON 4715); 1 ♂, 13 km SSE of Wodgina, 21.27972°S, 118.69888°E, 23 Sept. 2005–14 Sept. 2006, CALM Pilbara Survey (WAM T82039, PBI_OON 4714); 3 ♂, 4 ♀, 20 km ENE of Wodgina, 21.11472°S, 118.85166°E, 23 Sept. 2005–13 Sept. 2006, CALM Pilbara Survey (WAM T82041, PBI_OON 4716); 1 ♂, 32.5 km SSE of Wodgina, 21.45833°S, 118.72583°E, 23 Sept. 2005–14 Sept. 2006, CALM Pilbara Survey (WAM T82044, PBI_OON 4719); 4 ♂, 1 ♀, 8.5 km WSW of Yanyare River Mouth, 20.84277°S, 116.36694°E, 28 Nov. 2003–15 May 2005, CALM Pilbara Survey (WAM T82031, PBI_OON 4706).

Etymology. The specific name *triangularis* is a Latin adjective (feminine) meaning with triangle and refers to the triangle between the lateral apodemes of the postepigastric scutum in males.

Diagnosis. Males resemble those of *O. nadinene* in having scuto-pedicel region about diameter of pedicel, paired scutal ridges connected by arc, an elevated triangle of ridges between lateral apodemes, patella connection to femur

at anterior half and a strong prolateral spine at the bulbal base, but can be distinguished by the elongated and posteriorly rounded abdomen and the narrower more defined triangle of ridges (Fig. 145C). In females the epigynal fold (EF) posterior margin is widely triangular with tiny knob (Fig. 146F).

Description. *Male* (PBI_OON 04698, Figs 145A–J). Total length 1.33. Prosoma, mouthparts and abdominal scutae orange brown, legs pale orange. Carapace with angular posterolateral corners, surface of elevated portion of pars cephalica smooth, sides striated; lateral margin rebordered, with blunt denticles. Eyes, ALE: 0.068; PME: 0.069; PLE: 0.055, PME largest, ALE circular, PME squared; posterior eye row recurved from above; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME touching throughout most of their length, PLE–PME touching. Abdomen elongated, rounded posteriorly; book lung covers small, ovoid; scuto-pedicel region about diameter of pedicel, paired scutal ridges connected by arc; anterior margin of postepigastric scutum with well defined, elevated triangle of ridges. Palpal patella 0.297 long, 0.156 wide, connection to femur at 0.55; bulb ventrally strongly bulging with strong prolateral spine, tip spatulate with deep prolateral incision, ‘fenestra’ small (Figs 145 H–J).

Female (PBI_OON 23619, Figs 146A–G). Total length 1.61. Eyes, ALE: 0.066; PME: 0.062; PLE: 0.044. Epigastric area, ventral view, epigastric fold (EF) posterior margin widely triangular with tiny knob; in dorsal view paddle-like sclerite (PSc) with straight arms, bent at 2/3 length, reaching beyond epigastric fold; nail-like process (Na) short conical; globular appendix (GAp) hood-shaped (Fig. 146G).

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaena wheelarra Baehr & Ott, sp. nov.
(Figs 147A–J, 148A–G)

Material examined. Holotype ♂: AUSTRALIA: *Western Australia*: 33.5 km E of Wheelarra, 23.37250°S, 120.45805°E, 4 Sept. 2005–11 Aug. 2006, CALM Pilbara Survey (WAM T81859, PBI_OON 04471). Allotype

♀: collected with holotype (WAM T81859, PBI_OON 04471).

Other material examined. AUSTRALIA: *Western Australia*: 1 ♂, 19.7 km WNW of Mt Berry, 22.43750°S, 116.27416°E, 8 Sept. 2003–10 Oct. 2004, CALM Pilbara Survey (WAM T82144, PBI_OON 5089); same data, 1 ♂ (WAM T82146, PBI_OON 5091); 2 ♂, 5 km WSW of Python Pool, 21.34111°S, 117.18833°E, 8 May 2004–12 May 2005, CALM Pilbara Survey (WAM T82153, PBI_OON 5098); 32 ♂, 14 ♀, 33.5 km E of Wheelarra, 23.37250°S, 120.45805°E, 4 Sept. 2005–11 Aug. 2006, CALM Pilbara Survey (WAM T81859, PBI_OON 4471).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. pilbara* in general body shape and in having scuto-pedicel region about diameter of pedicel, paired scutal ridges connected by arc, area between anterior and posterior spiracles slightly concave and dotted but no setae, but can be recognised by the larger eyes, sternum with posterior notch, anterior area of notch covered with small pits, palpal patella connection to femur at 0.61; bulb slender, ventrally slightly bulging, tip prolaterally incised, spatulate, bent medially with striated ridge, ‘fenestra’ larger, distal from incision (Fig. 147 I). In females the epigynal fold (EF) anterior margin is straight with small knob; posterior margin with two small sclerotized edges.

Description. *Male* (PBI_OON 04471, Figs 147 A–J). Total length 1.84. Prosoma, mouthparts, palpal patella and abdominal scutae orange brown, legs pale orange. Carapace broadly oval, pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface of elevated portion of pars cephalica smooth, sides strongly reticulate; lateral margin straight, rebordered, with blunt denticles. Eyes, ALE: 0.085; PME: 0.085; PLE: 0.063, ALE, PME subequal, larger than PLE, ALE circular, PME squared; posterior eye row recurved from above; ALE separated by their radius to diameter, ALE–PLE separated by less than ALE radius, PME touching for less than half their length, PLE–PME touching. Sternum as long as wide, with radial furrows between coxae I–II, II–III, III–IV, furrow with rows of small pits, surface smooth, lateral margin with infra-coxal grooves and anterior and posterior openings,

with posterior notch, anterior area of notch covered with small pits. Abdomen globular, rounded posteriorly; book lung covers large, ovoid; scuto-pedicel region about diameter of pedicel, paired scutal ridges connected by arc, plumose setae lateral of pedicel; postepigastric scutum between anterior and posterior spiracles slightly concave and dotted but no setae. Palpal patella 0.373 long, 0.188 wide, connection to femur at 0.61; bulb ventrally slightly bulging, tip prolaterally incised, spatulate, bent medially with striated ridge, 'fenestra' large, distal from incision (Fig. 147H-J).

Female (PBI_OON 4471, Figs 148A-G). Total length 1.86. Eyes, ALE: 0.091; PME: 0.086; PLE: 0.063; ALE largest. Epigastric area, ventral view, epigastric fold (EF) anterior margin straight with small knob; posterior margin with two small sclerotized edges; in dorsal view paddle-like sclerite (PSc) with straight arms, bent at 2/3 length, reaching beyond epigastric fold (Fig. 148G); nail-like process (Na) short conical; globular appendix (GAp) hood-shaped with drop-shaped extension.

Distribution. This species is known only from the Pilbara in Western Australia.

Opopaea whim Baelr & Harvey, sp. nov.
(Figs 149A-J)

Material examined. Holotype ♂: AUSTRALIA: Western Australia: 11 km SSE of Whim Creek Hotel, 20.91972°S, 117.86111°E, 11 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T81986, PBI_OON 4658).

Other material examined. AUSTRALIA: Western Australia: 9 ♂, 5 ♀, 10 km S of Mallina Homestead, 20.96944°S, 118.04833°E, 11 July 2003–3 Oct. 2004, CALM Pilbara Survey (WAM T81937, PBI_OON 4631); 1 ♂, 32 km E of Port Hedland, 20.32444°S, 118.92222°E, 25 July 2005–25 Aug. 2006, CALM Pilbara Survey (WAM T81970, PBI_OON 4639).

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males resemble those of *O. cowra* in general body shape, having a finely reticulated carapace, scuto-pedicel region less than diameter of pedicel, paired scutal ridges short, not connected, patella connection to femur at anterior half and the broad complex folded bulbal tip, but can be distinguished by

the absence of any prolateral extension at the middle of the bulb (Figs 149H, I).

Description. *Male* (PBI_OON 04658, Figs 149A-J). Total length 1.35. Prosoma, mouthparts and abdominal scutae pale orange, palpal patella orange brown, legs yellow. Carapace ovoid, pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface finely reticulate; lateral margin straight, rebordered, without denticles. Eyes, ALE: 0.061; PME: 0.061; PLE: 0.053, ALE, PME subequal, larger than PLE, ALE oval, PME oval; posterior eye row recurved from above; ALE separated by their radius to diameter, ALE-PLE separated by less than ALE radius, PME separated by less than their radius, PLE-PME separated by less than PME radius. Sternum as long as wide, with radial furrows between coxae I-II, II-III, III-IV, furrow with rows of small pits, surface smooth. Abdomen ovoid; book lung covers small, ovoid; scuto-pedicel region about ¾ of diameter of pedicel, with weak paired scutal ridges, not connected. Palpal patella 0.248 long, 0.126 wide, connection to femur at 0.55; bulb ventrally slightly bulging, with small prolateral folds close to tip, tip broad with long prolateral ribbed fold bent dorsally, 'fenestra' close to tip (Figs 149 H-J).

Female. Unknown.

Distribution. This species is known only from the Pilbara in Western Australia.

ACKNOWLEDGMENTS

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Sydney), Norman Platnick (American Museum of Natural History, New York), Robert Raven, Owen Seeman and Wendy Hebron (Queensland Museum, Brisbane), Petra Sierwald (Field Museum of Natural History, Chicago) and Julianne Waldock (Western Australian Museum, Perth) for the loan of the material examined and their support of the project. We thank Sue Lindsay (Australian Museum) for assisting with scanning electron microscopy for Baehr & Smith species, and Nadine Duperre for doing SEM's for the palp of *O. foveolata*. We thank Robert Whyte (Brisbane) for his comments on the manuscript and Wendy Hebron for her beautiful colour painting of *O. ulrichi*.

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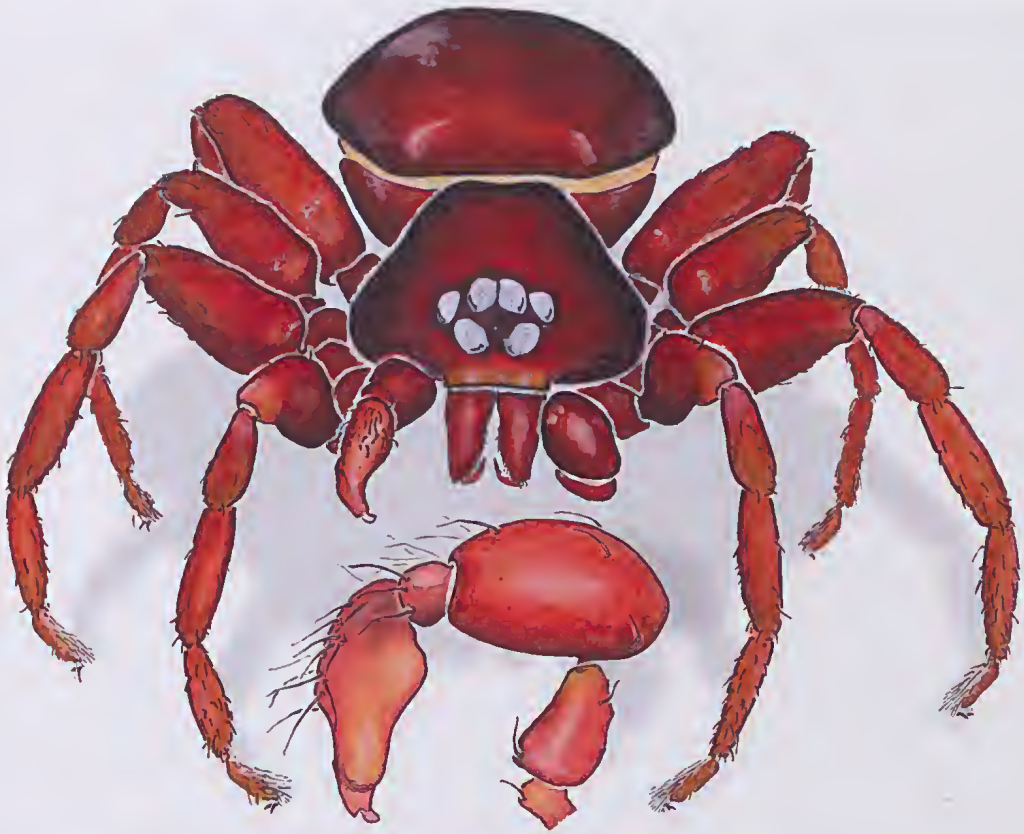


FIG. 1. Colourpainting of *Opopaea ulrichi* frontal view; male palp, retrolateral view.

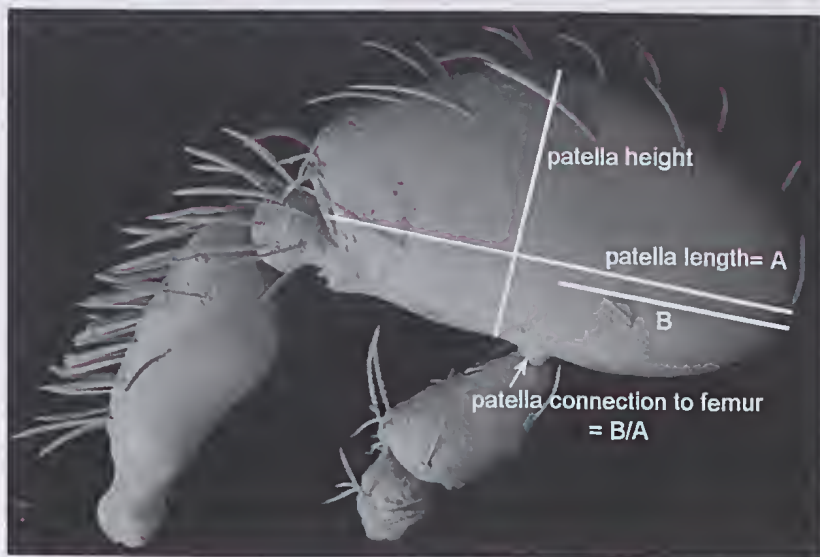


FIG. 2. Scanning electron microscope image of *Opopaea*, left palp explaining measurements.

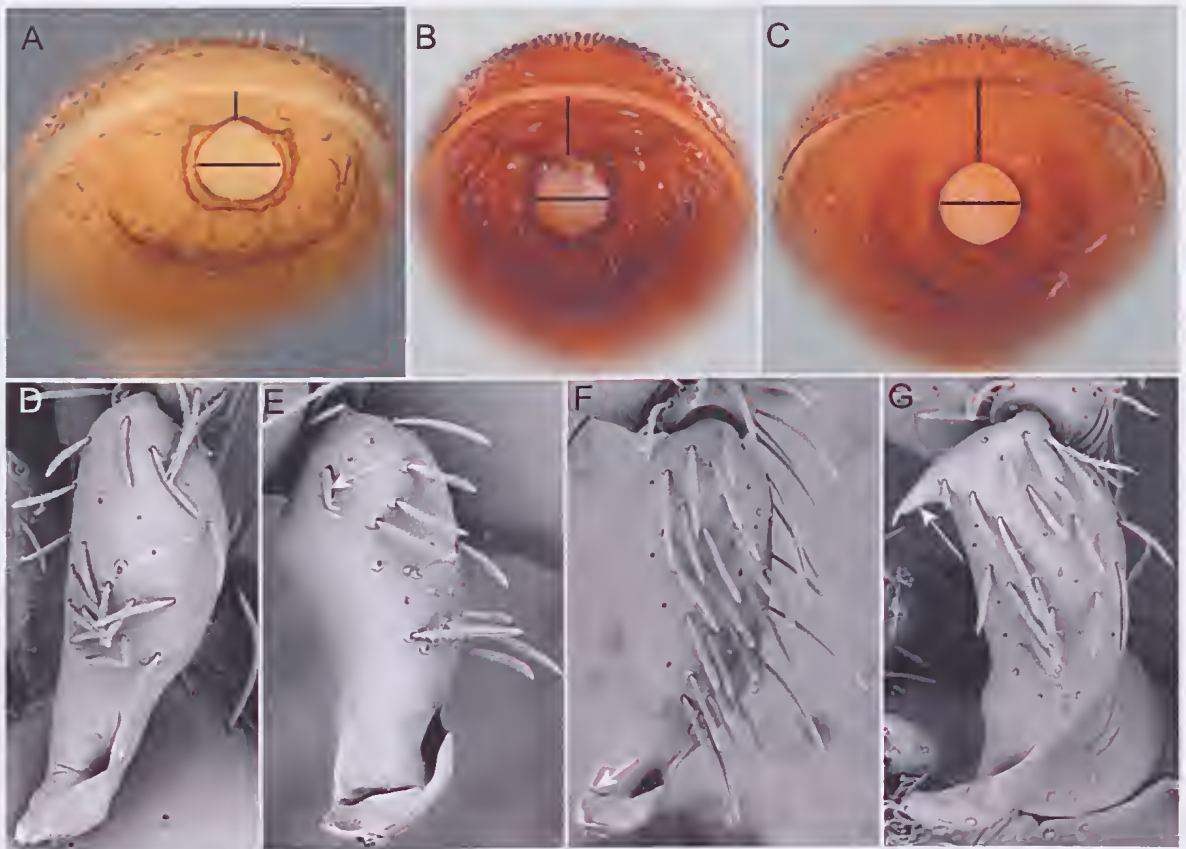


FIG. 3. A-C, *Opopaea opisthosoma*, frontal view. D-G, *Opopaea* palps, showing characters: A, scuto-pedichel region about $\frac{1}{2}$ of diameter of pedichel; B, scuto-pedichel region about diameter of pedichel; C, scuto-pedichel region about $1\frac{1}{2}$ diameter of pedichel; D, arrow: tarsal organ; E, arrow: bulbal base with 2 strong prolateral spines; F, arrow: prolateral incision at tip; G, arrow: prolateral spur.

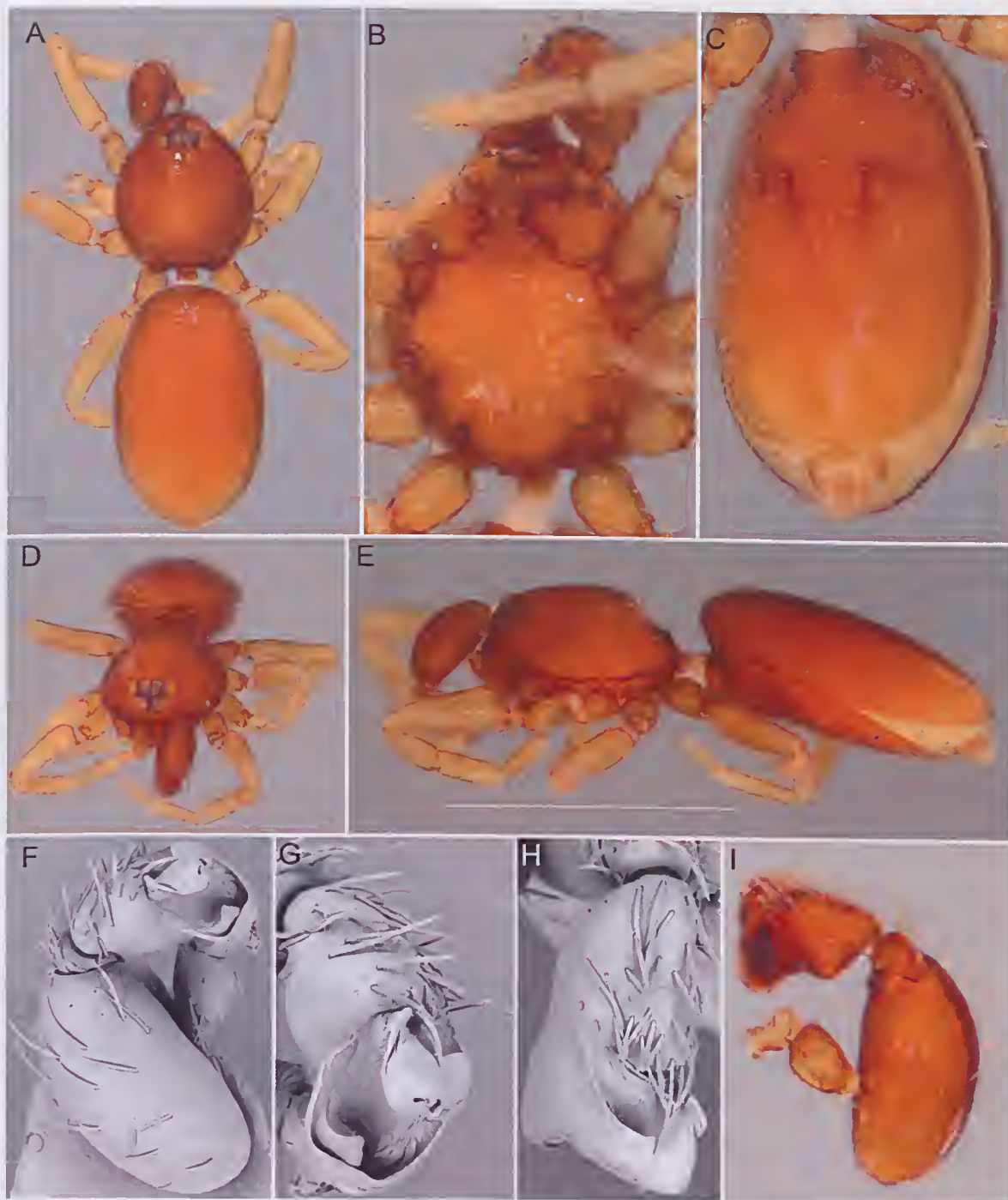


FIG. 4. *Opopaea fiji* Baehr, sp. nov., male (PBI_OON 27962 photo, PBI_OON 22581 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, male palp, prolateral view; G, same, anterior view; H, same, dorsal view; I, same, retrolateral view.

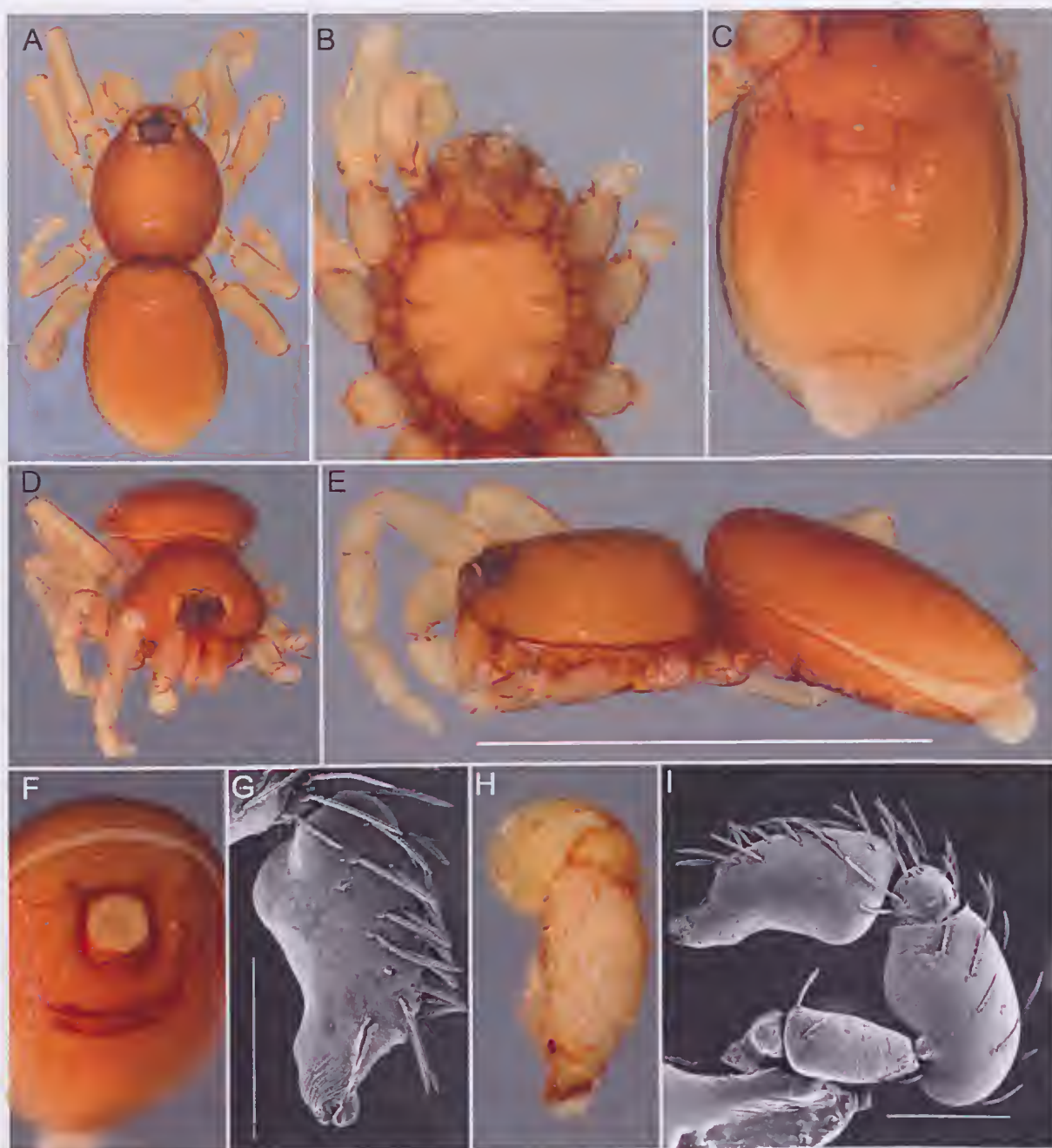


FIG. 5. *Opopaea foveolata* Roewer, 1963, male (PBI_OON 22620 photo, PBI_OON 27961 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, male palp, prolateral view; H, same, dorsal view; I, same, retrolateral view.

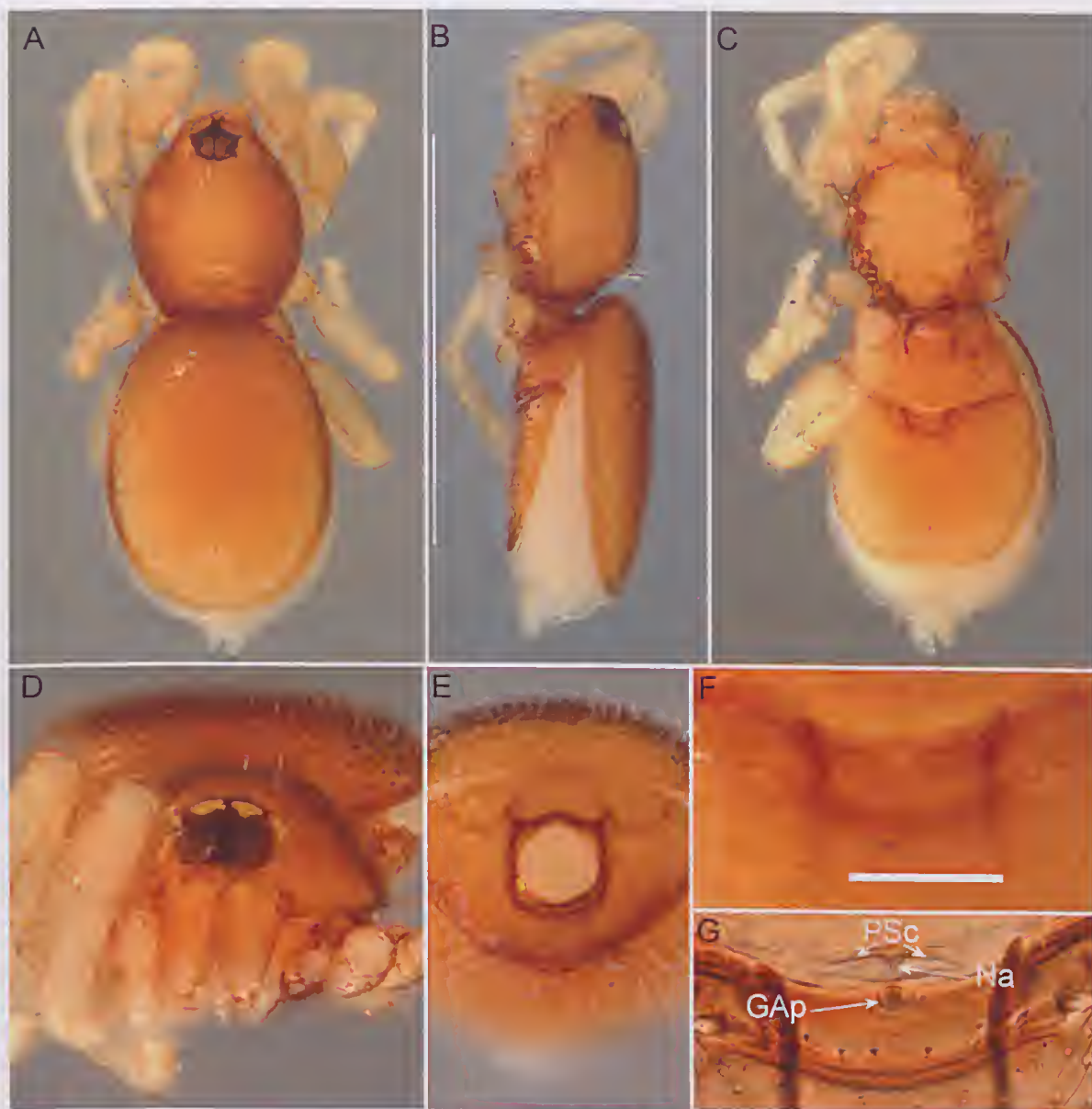


FIG. 6. *Opopaea foveolata* Roewer, 1963, female (PBI_OON 07398): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view (PBI_OON 27958). PSc, t-shaped or paddle like sclerite; Na, nail-like process, situated near genital opening with fitting into posterior situated globular appendix; GAP, globular appendix.



FIG. 7. *Opopaea hawaii* Baehr, sp. nov., male (PBI_OON 00207 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 8. *Opopaea palau* Bachr, sp. nov., male (PBI_OON 27965 photo, PBI_OON 10848 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 9. *Opopaea amien* Baehr, sp. nov., male (PBI_OON 22622ps): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, bulbal tip, dorsal view; G, male palp, prolateral view; H, male bulb, prolateral view; I, same, dorsal view; J, male palp, retrolateral view.

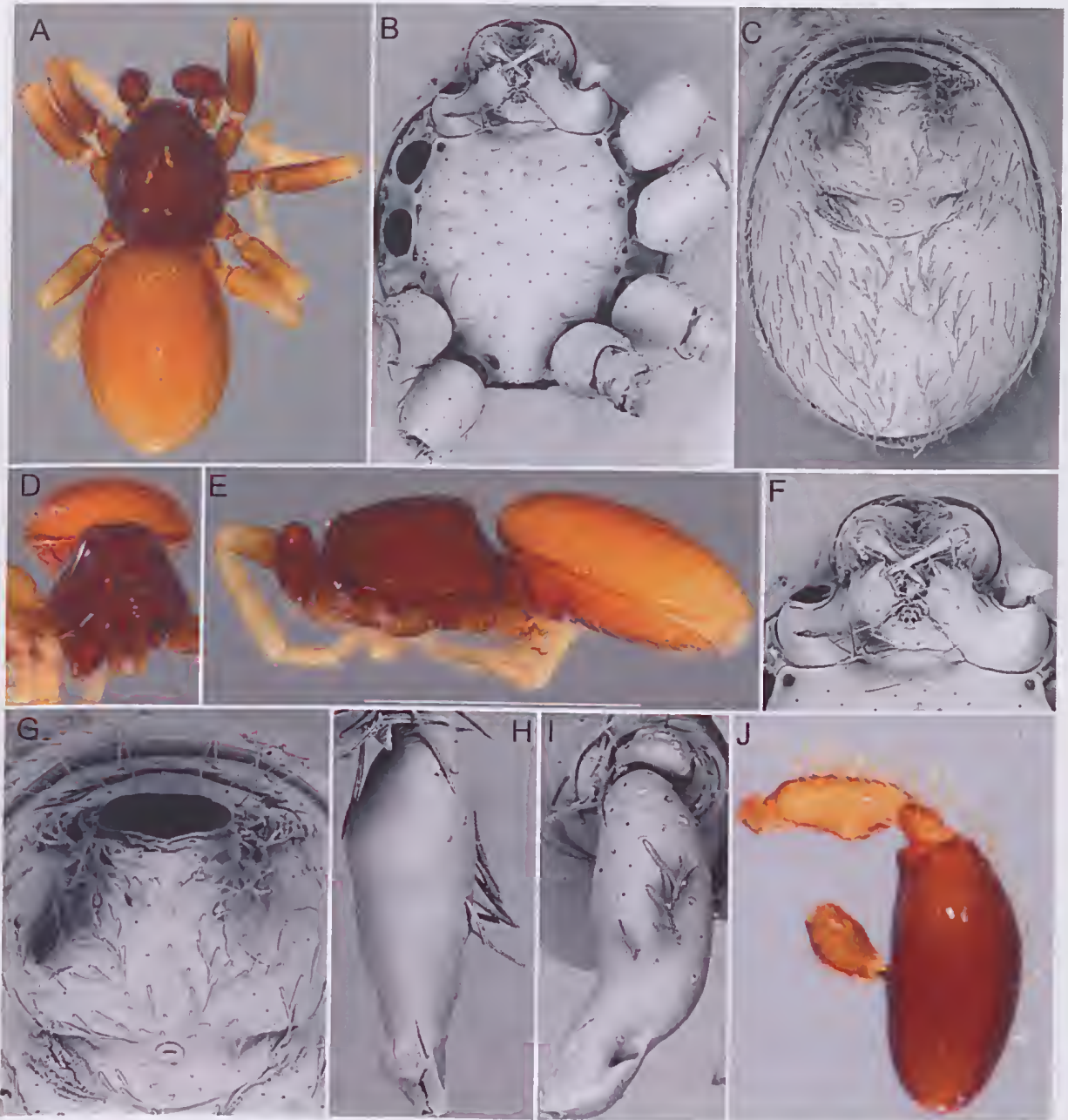


FIG. 10. *Opopaea bicolor* Baehr, sp. nov., male (PBI_OON 22621 photo, PBI_OON 23436 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 11. *Opopaea bicolor* Baehr, sp. nov., female (PBI_OON 23435): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

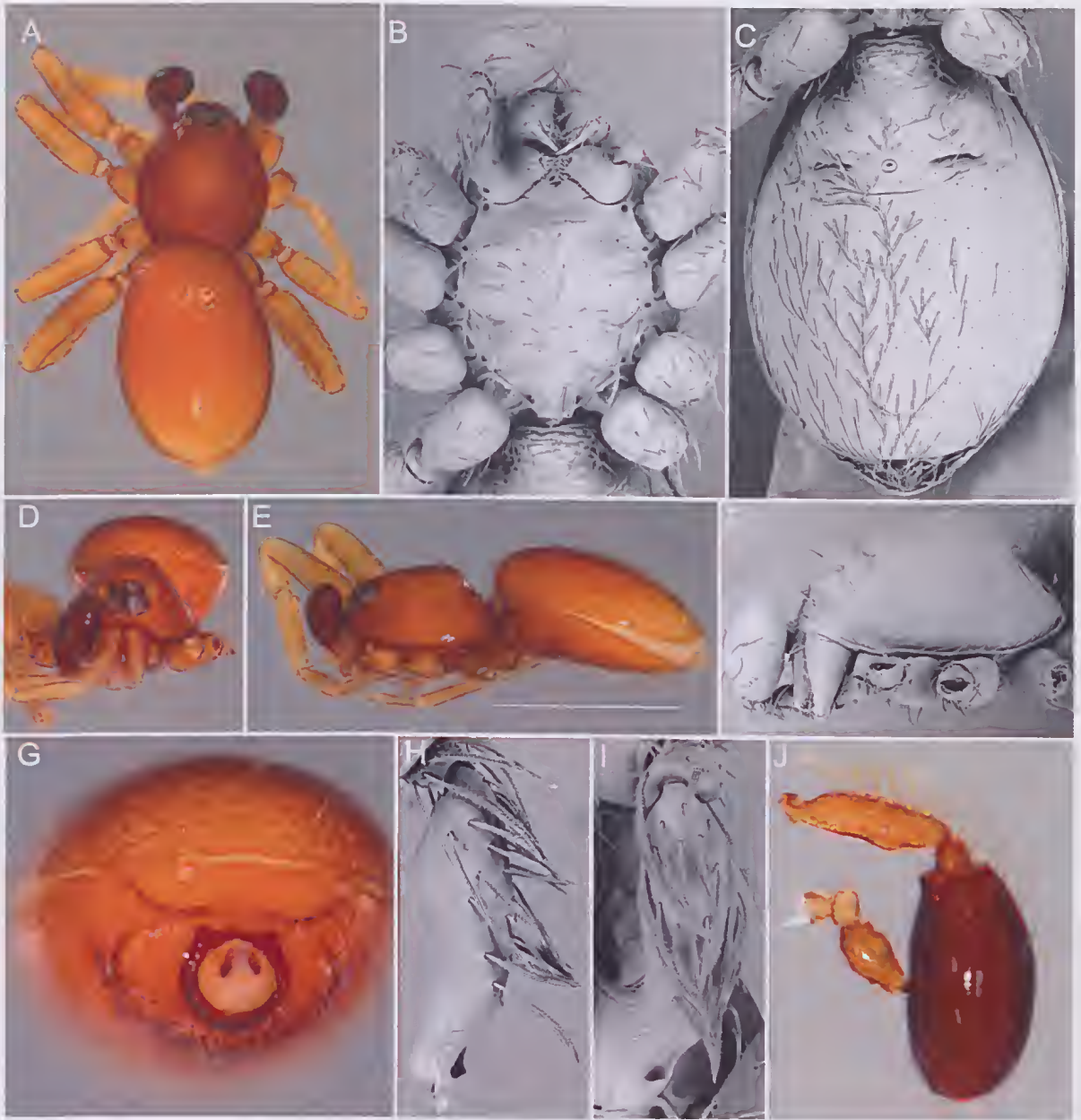


FIG. 12. *Opopaea burwelli* Baehr, sp. nov., male (PBI_OON 22591 photo, PBI_OON 23425 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, lateral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

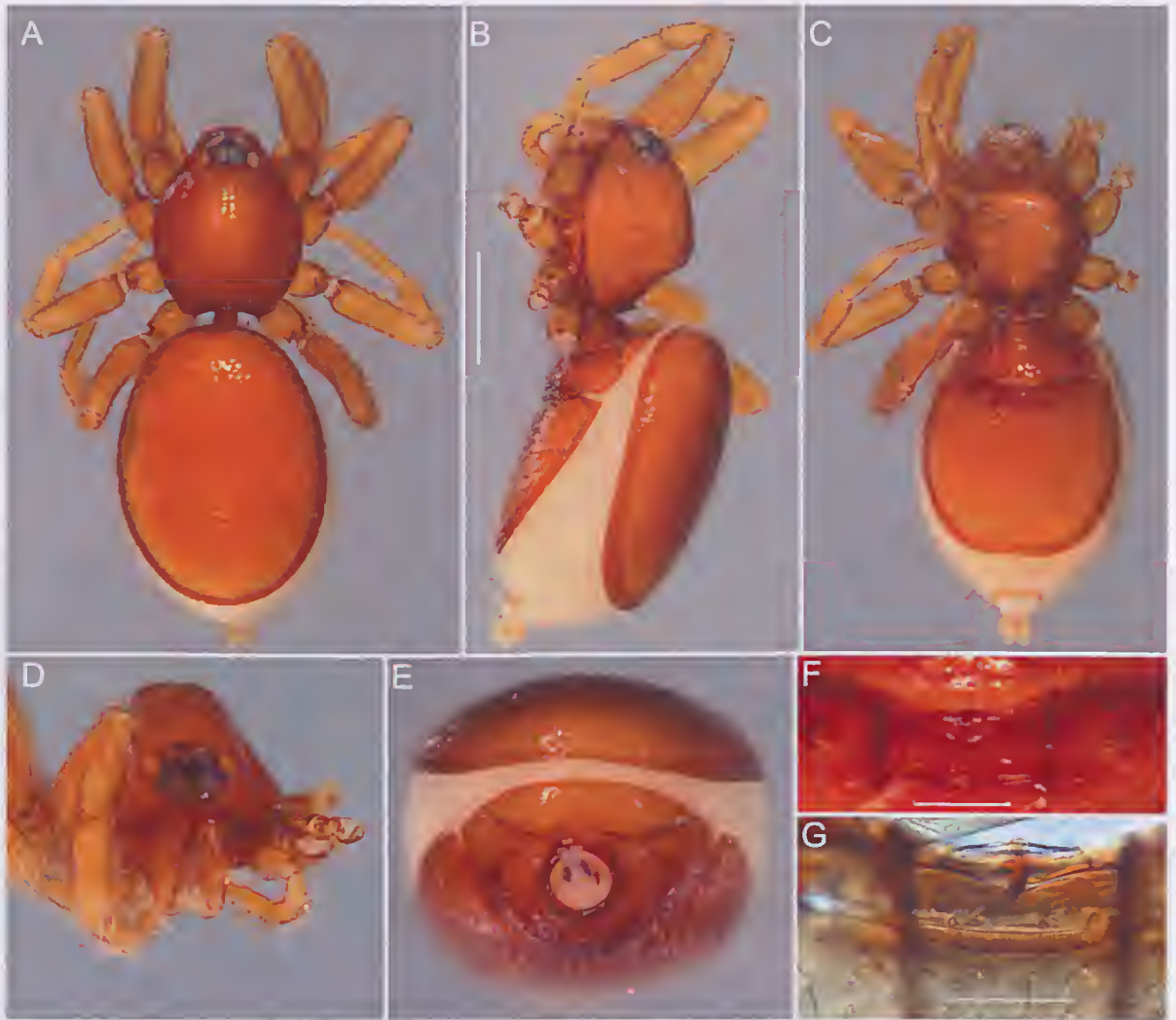


FIG. 13. *Opopaea burwelli* Baehr, sp. nov., female (PBI_OON 23424): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

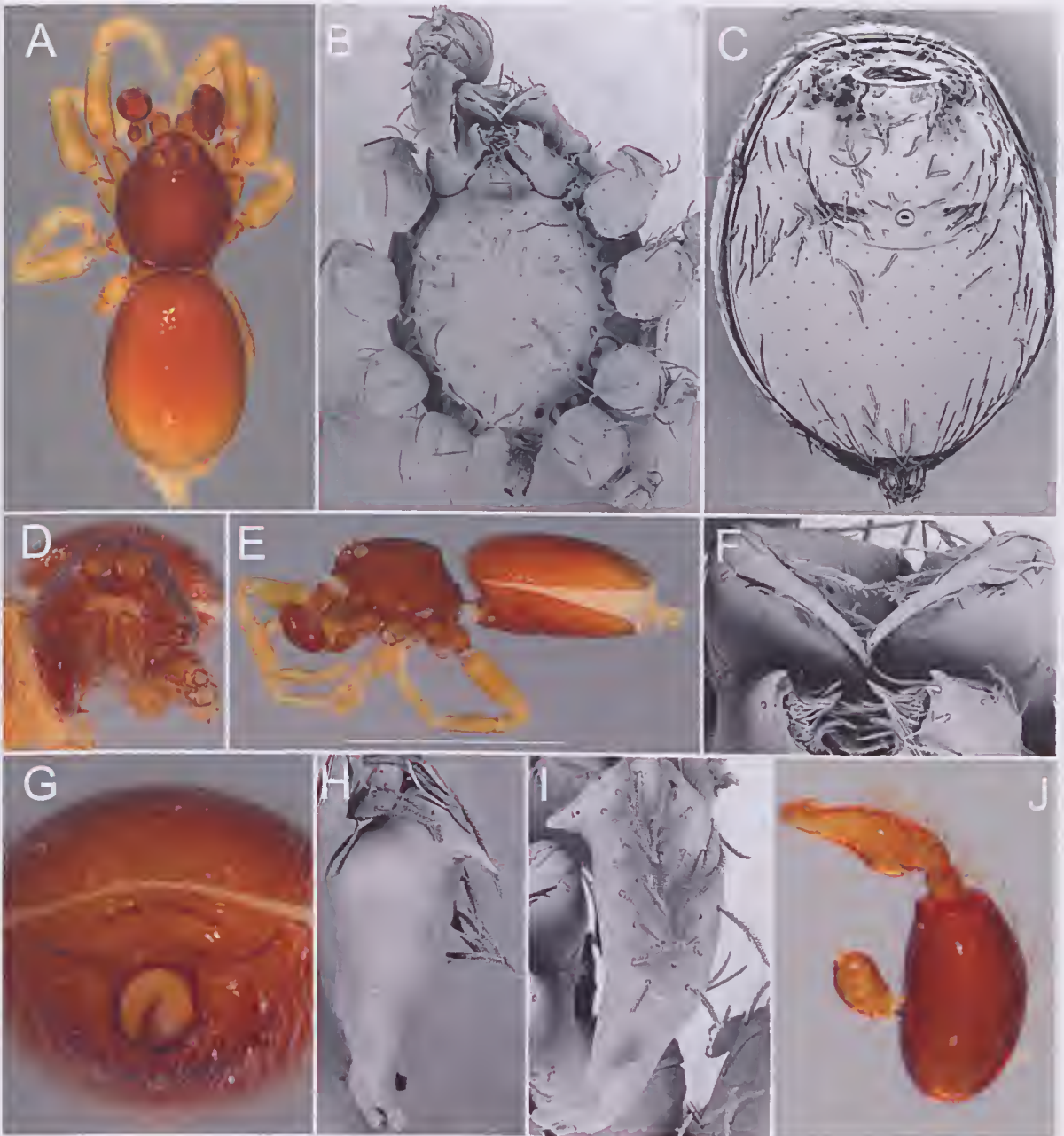


FIG. 14. *Opopaea calcaris* Baehr, sp. nov., male (PBI_OON 22617 photo, PBI_OON 22581 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

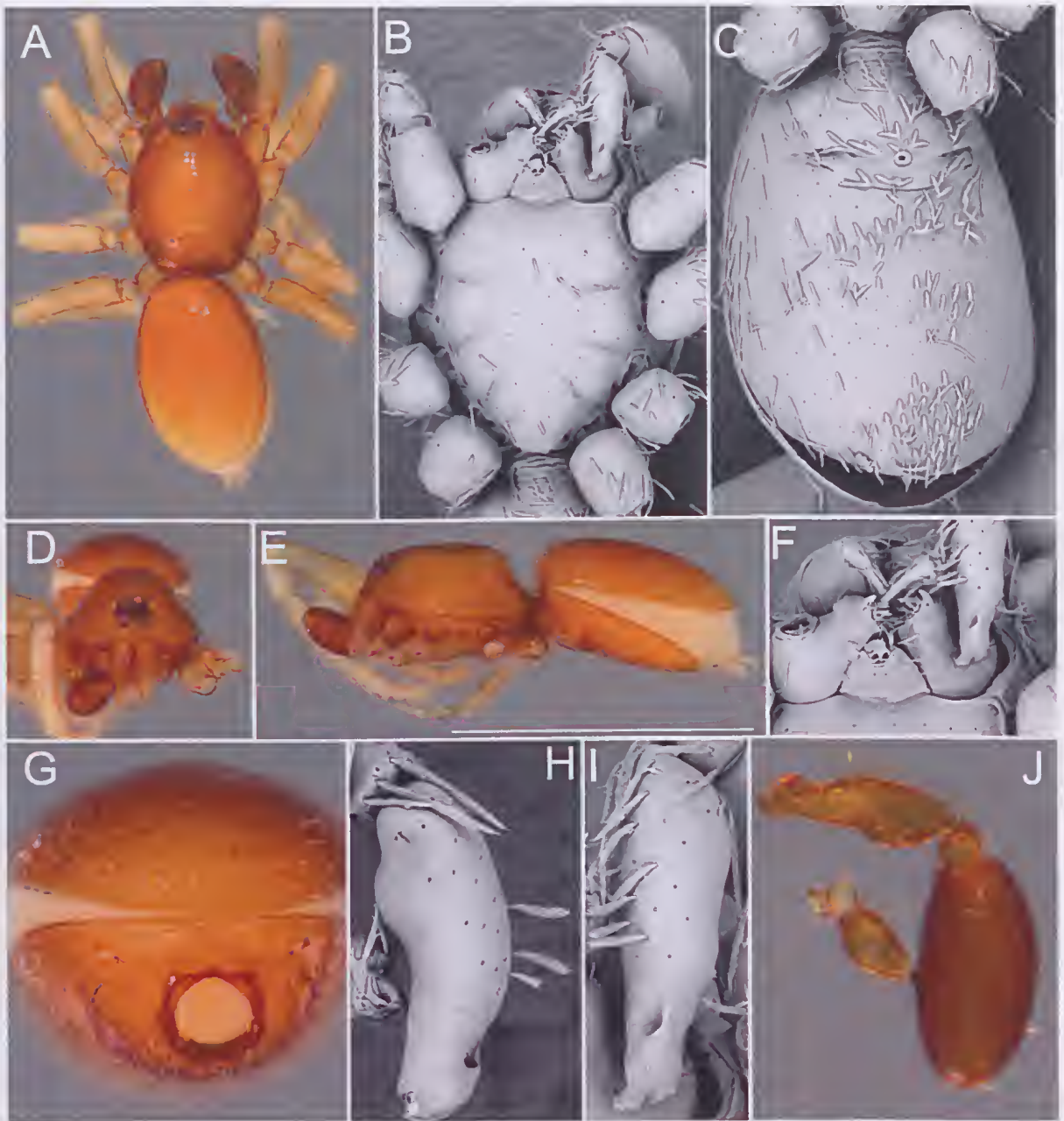


FIG. 15. *Opopaen goloboffi* Baehr, sp. nov., male (PBI_OON 23426 photo, PBI_OON 00213 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

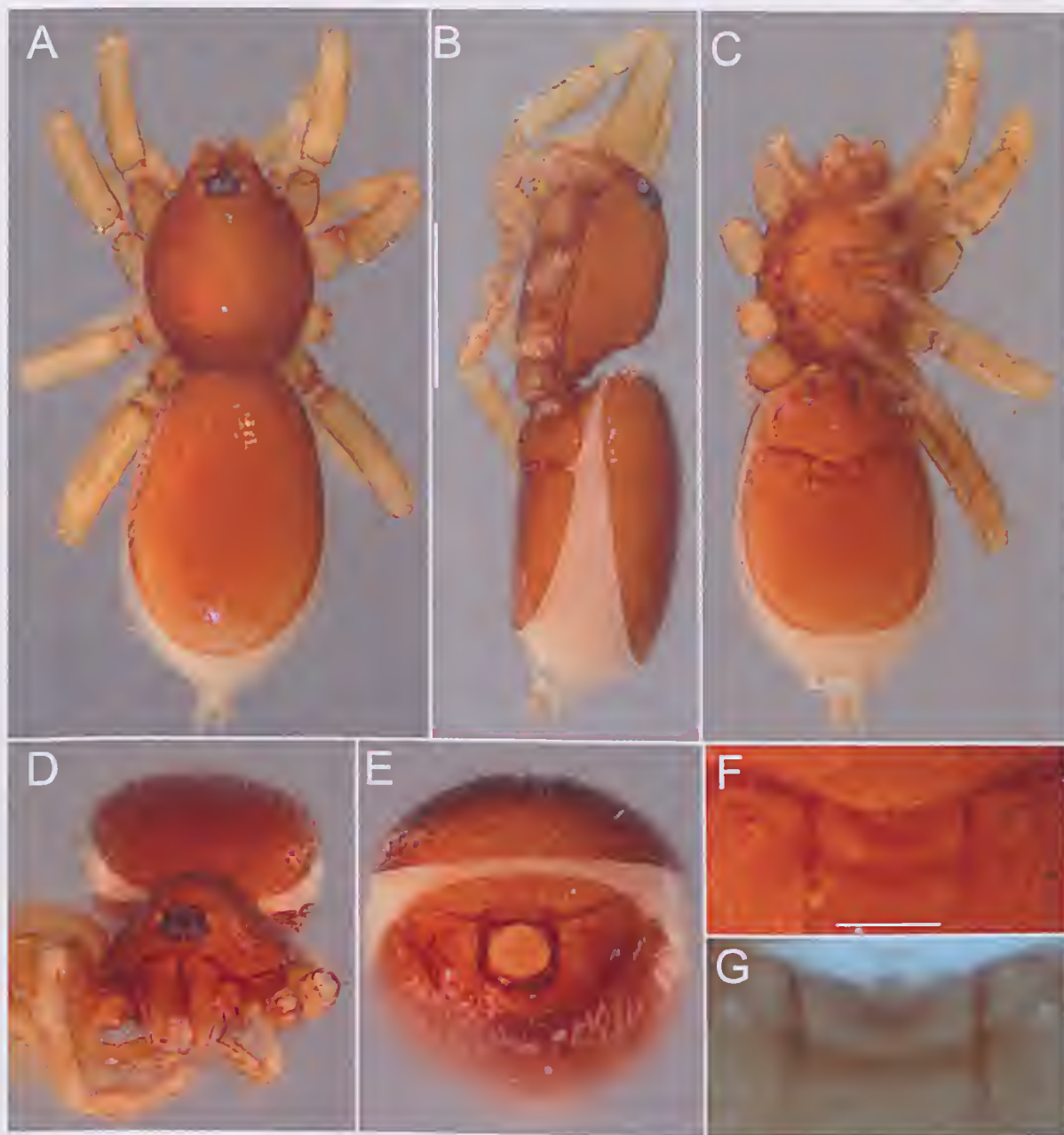


FIG. 16. *Opopaea goloboffi* Baehr, sp. nov., female (PBI_OON 22635): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 17. *Opopaea monteithi* Baehr, sp. nov., male (PBI_OON 22640 photo, PBI_OON 22630 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

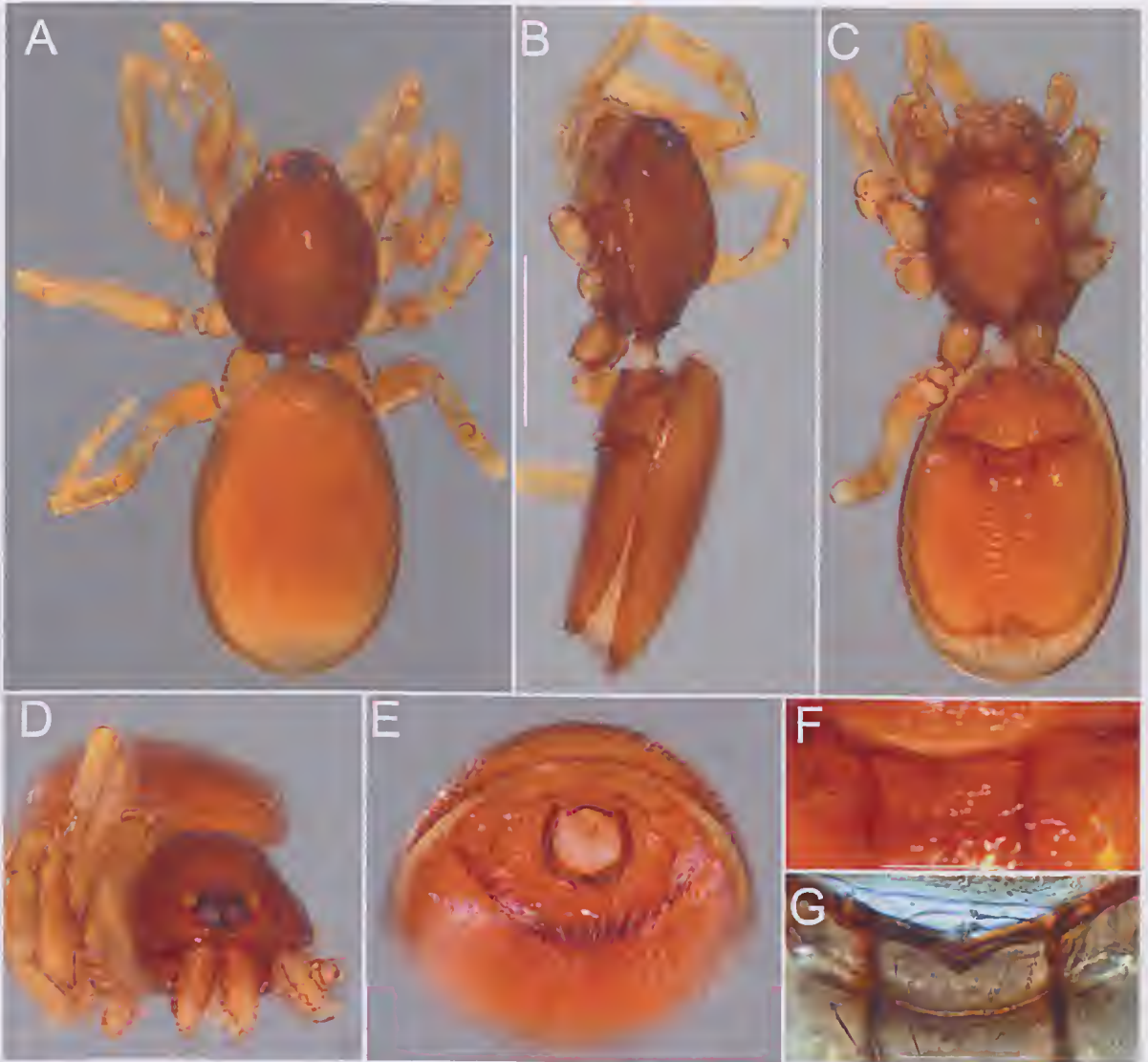


FIG. 18. *Opopaea monteithi* Baehr, sp. nov., female (PBI_OON 23429): **A**, habitus, dorsal view; **B**, same, lateral view; **C**, same, ventral view; **D**, prosoma, anterior view; **E**, opisthosoma, anterior view; **F**, female epigyne, ventral view; **G**, same, dorsal view.

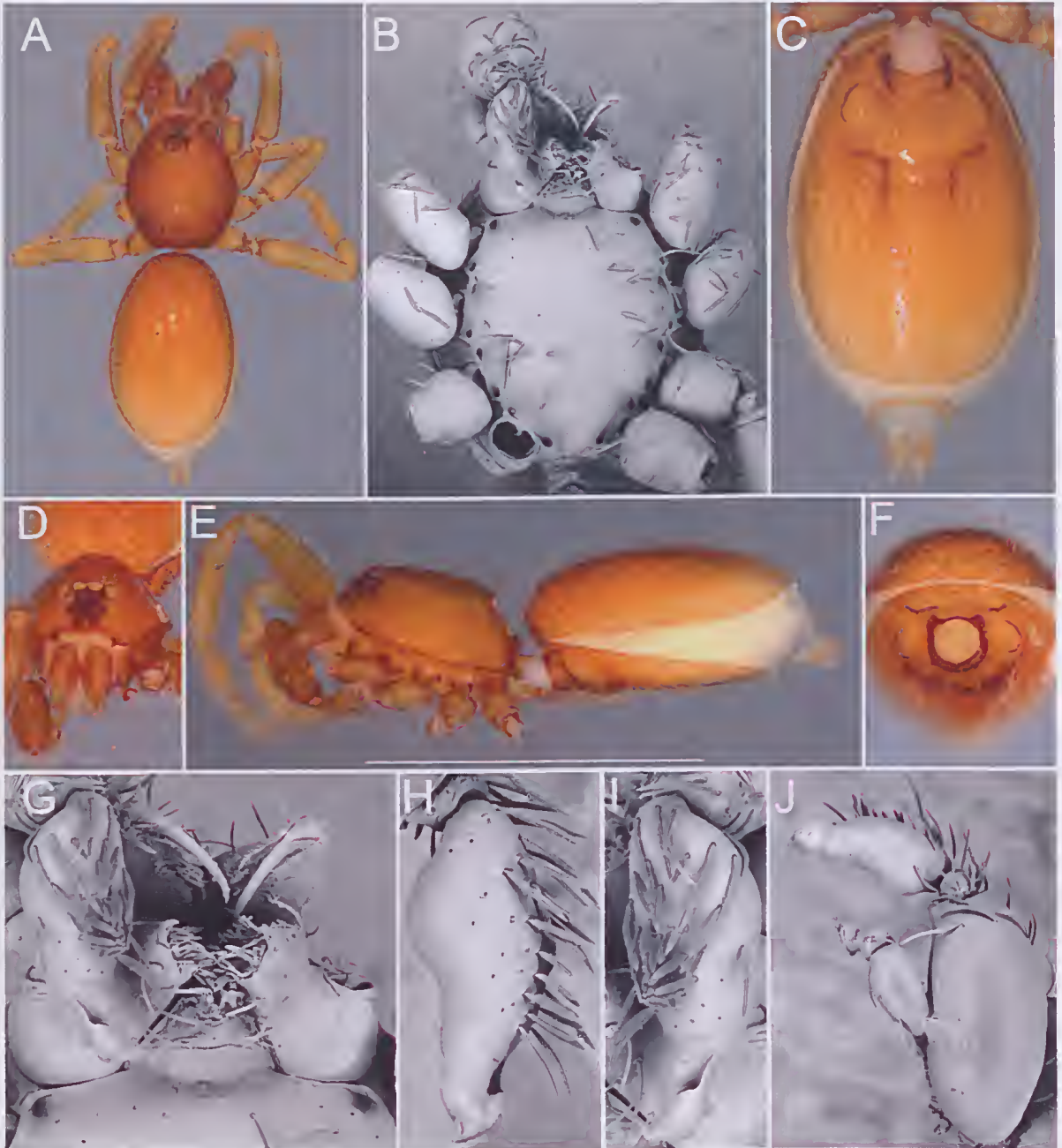


FIG. 19. *Opopaea ndoua* Baehr, sp. nov., male (PBI_OON 22572 photo, PBI_OON 22653 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, mouthparts, ventral view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

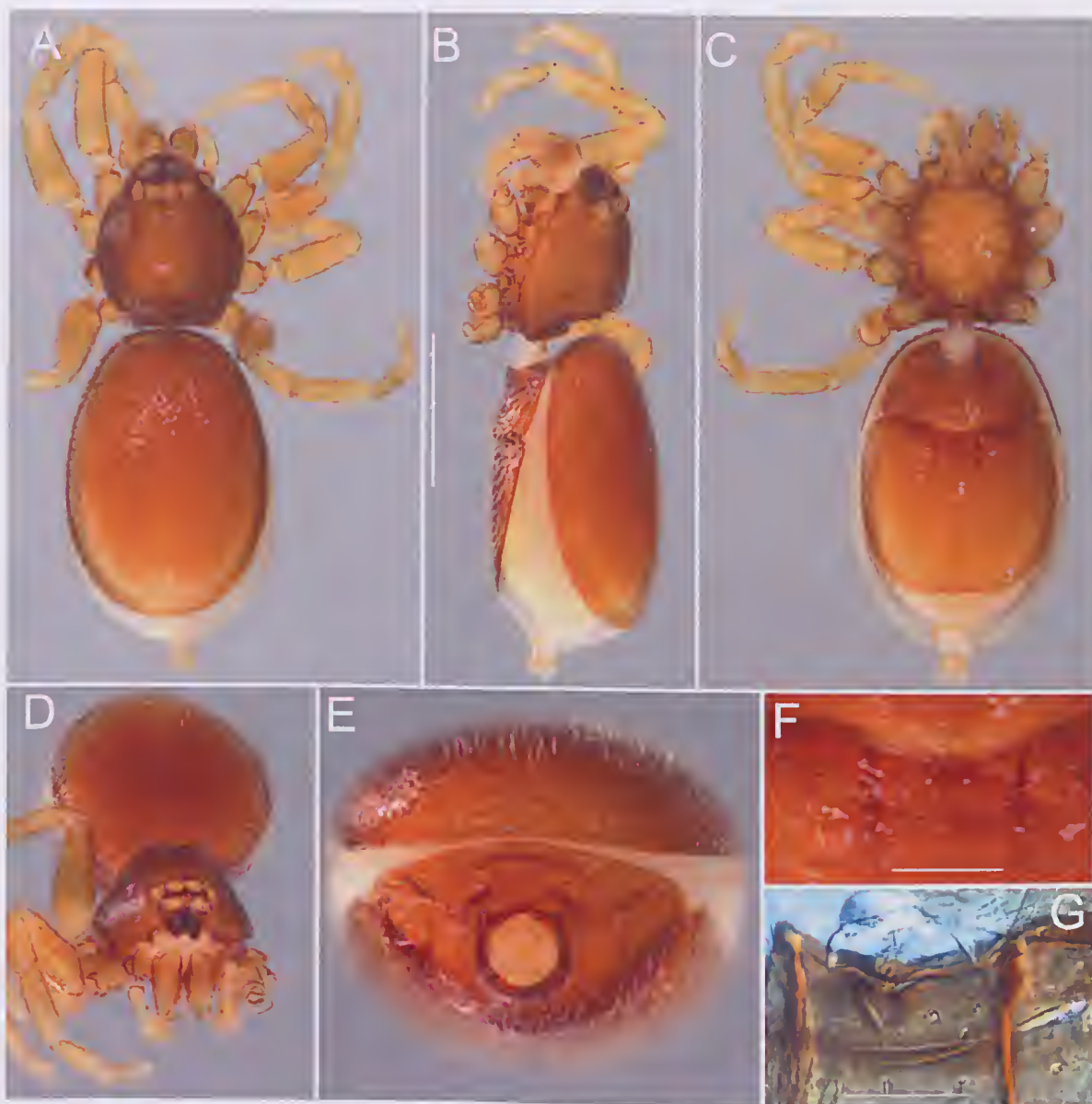


FIG. 20. *Opopaea ndoua* Baehr, sp. nov., female (PBI_OON 23449): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 21. *Opopaea platnicki* Baehr, sp. nov., male (PBI_OON 00215 photo, PBI_OON 23443 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, Sperm pore, ventral view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

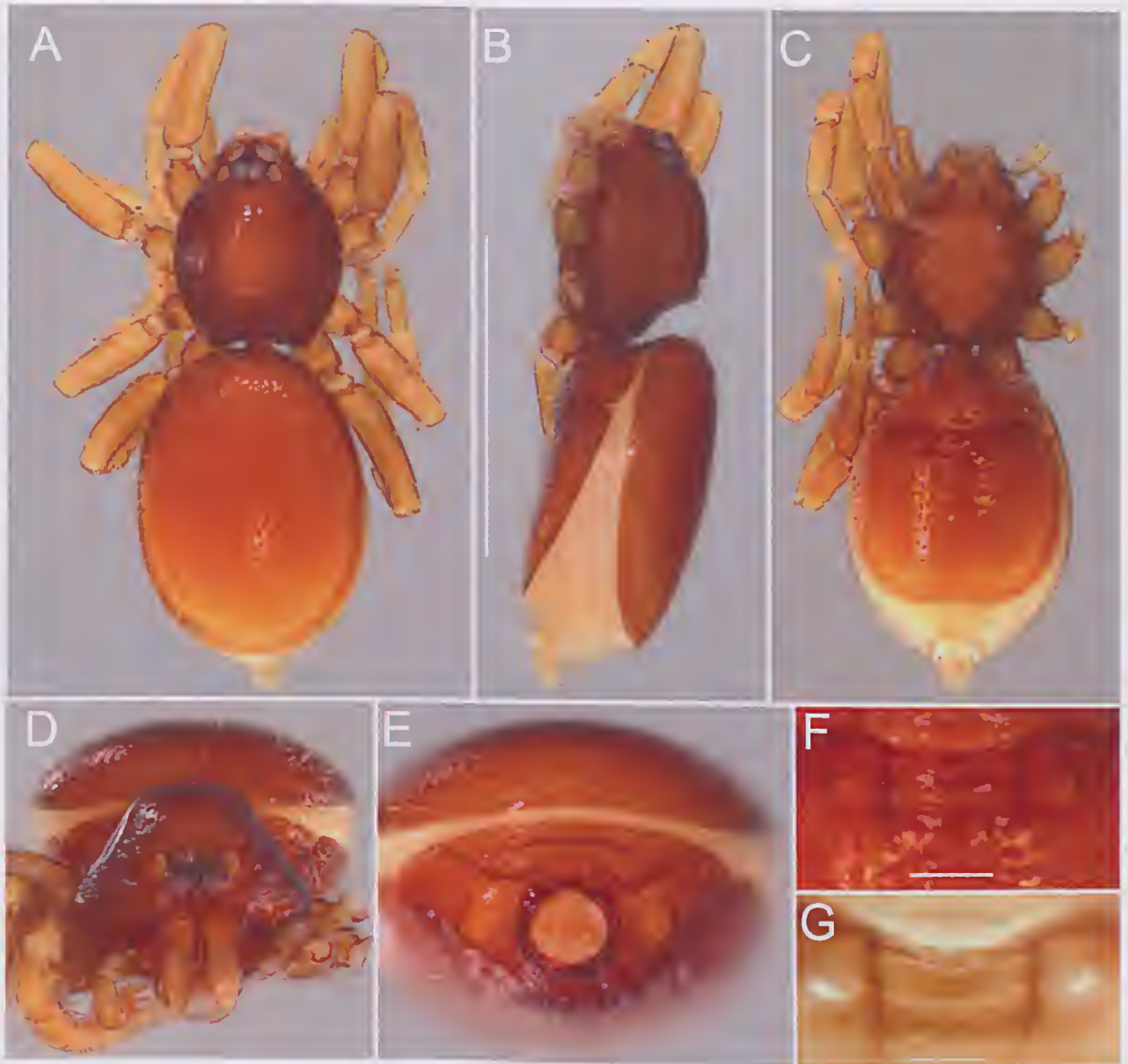


FIG. 22. *Opopaea platnicki* Baehr, sp. nov., female (PBI_OON 23443): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

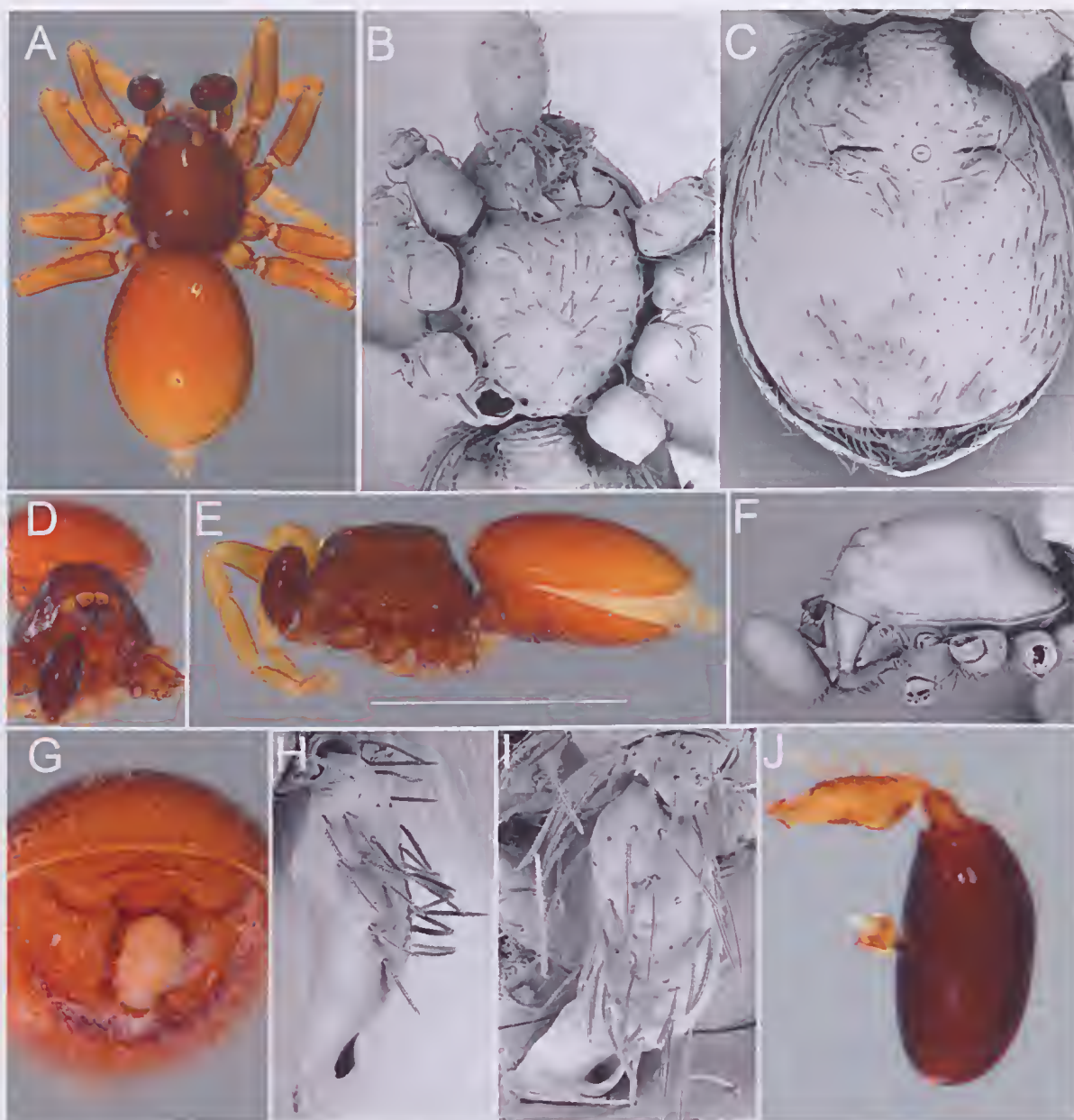


FIG. 23. *Opopaea raveni* Baehr, sp. nov., male (PBI_OON 22656 photo, PBI_OON 22601 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, lateral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

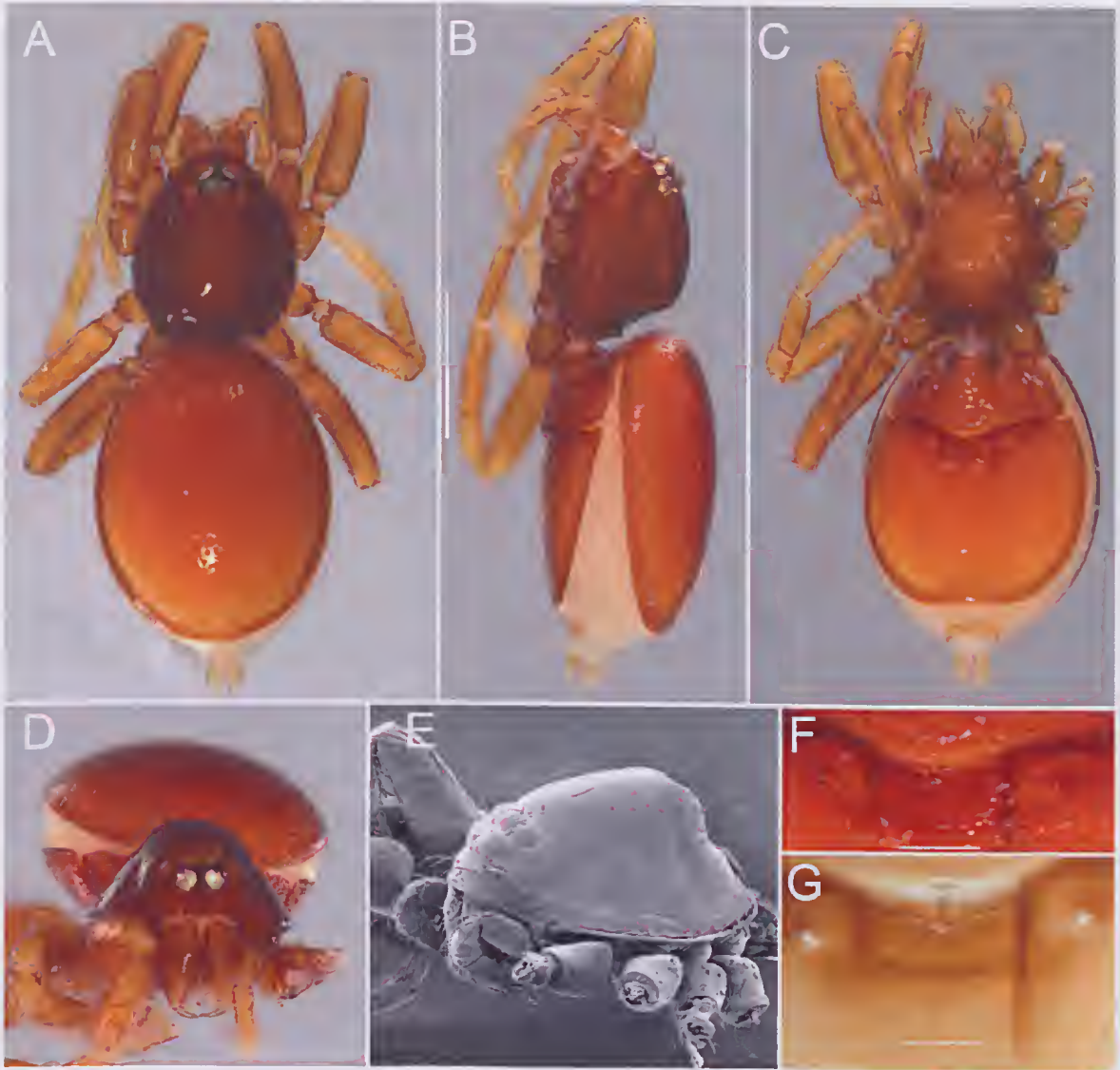


FIG. 24. *Opopaea raveni* Baehr, sp. nov., female (PBI_OON 22595): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, prosoma, lateral view; F, female epigyne, ventral view; G, same, dorsal view.

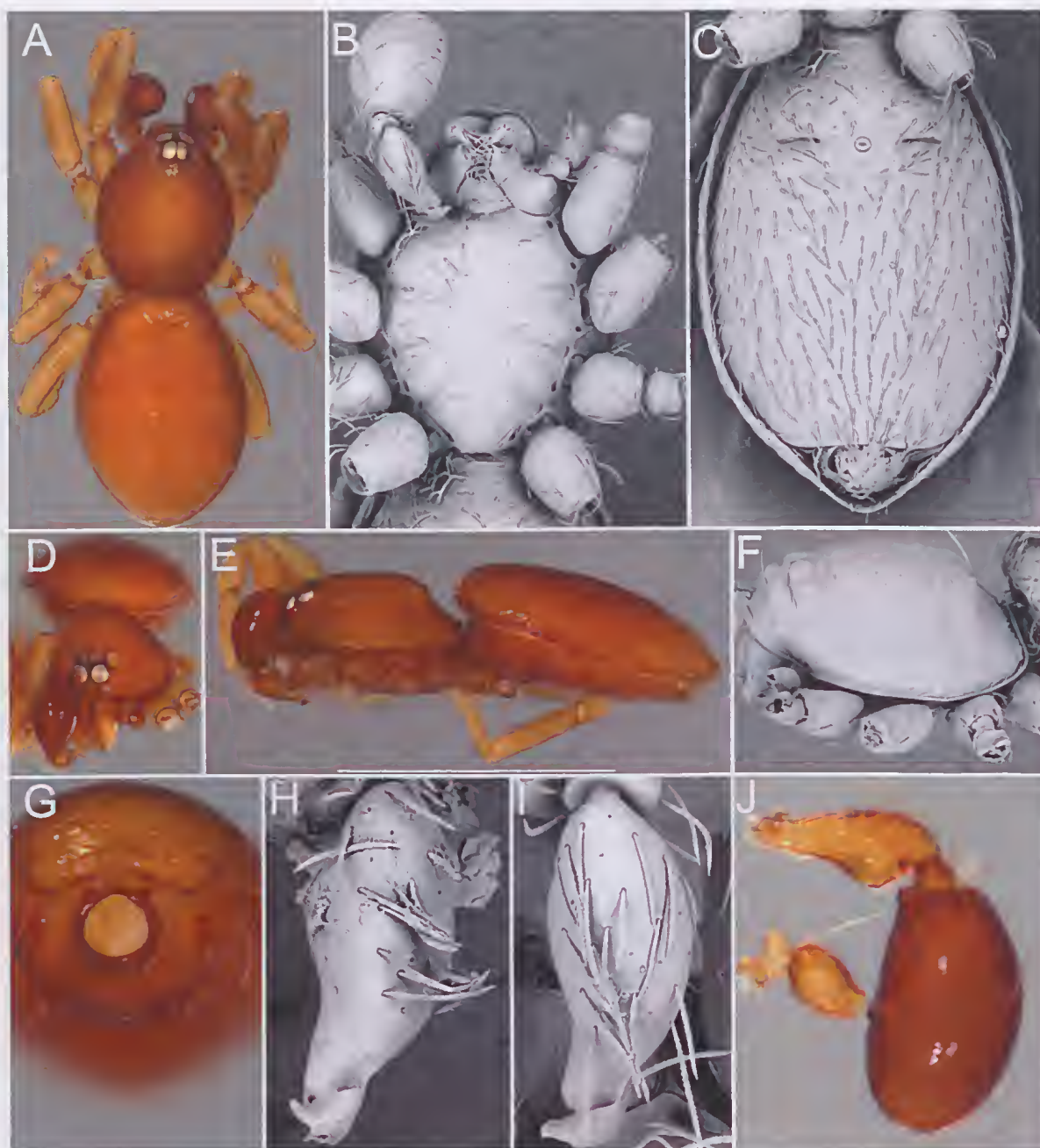


FIG. 25. *Opopaea striata* Baehr, sp. nov., male (PBI_OON 22632 photo, PBI_OON 22605 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, lateral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 26. *Opopaea striata* Bachr, sp. nov., female (PBI_OON 23427): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 27. *Opopaea touho* Baehr, sp. nov., male (PBI_OON 22663 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, male palp, prolateral view; H, same, dorsal view; I, palp tip, dorsal view; J, Palp, retrolateral view.

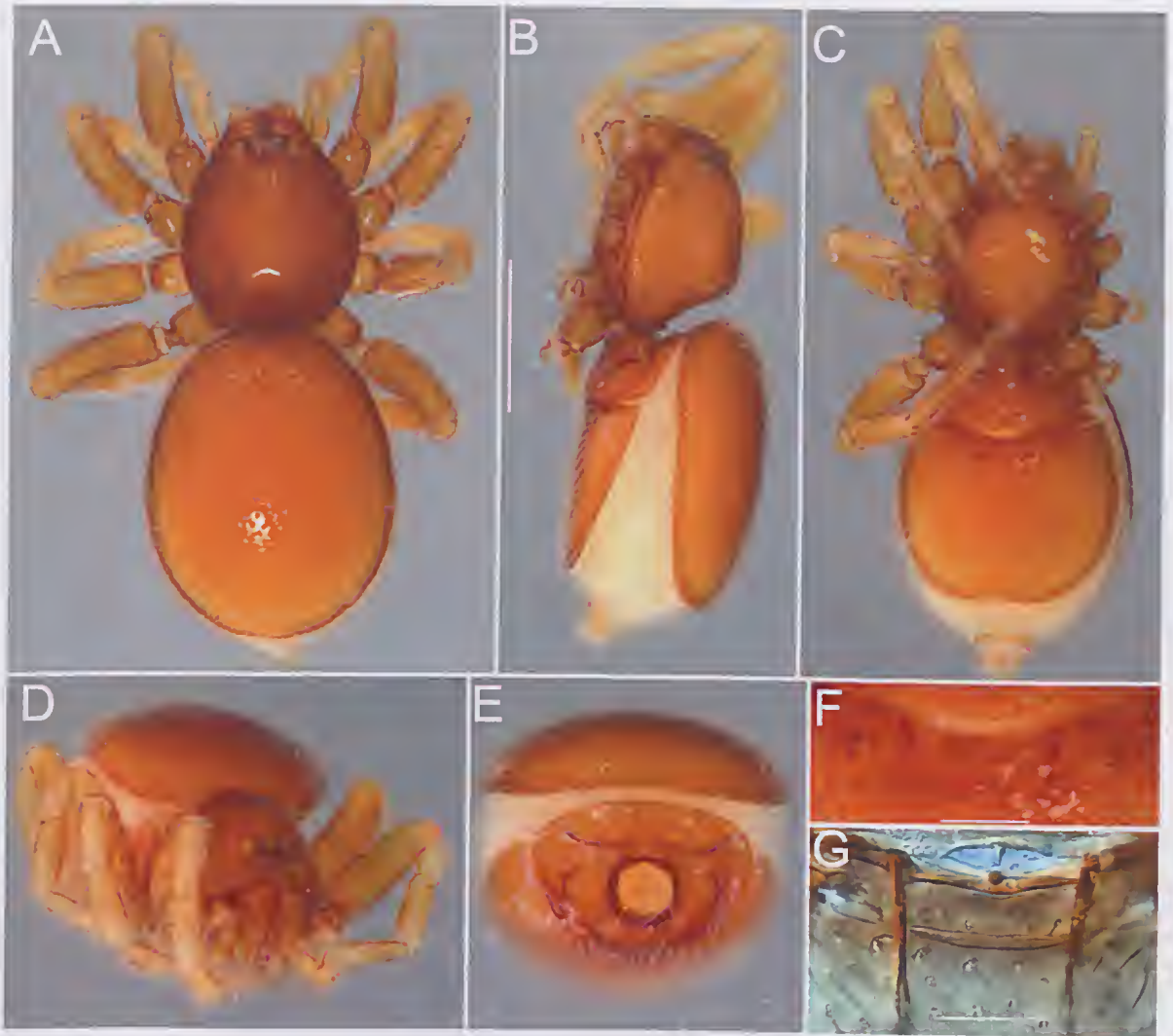


FIG. 28. *Opopaea touho* Baehr, sp. nov., female (PBI_OON 23428): **A**, habitus, dorsal view; **B**, same, lateral view; **C**, same, ventral view; **D**, prosoma, anterior view; **E**, opisthosoma, anterior view; **F**, female epigyne, ventral view; **G**, same, dorsal view.



FIG. 29. *Opopaea tuberculata* Baehr, sp. nov., male (PBI_OON 22651 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

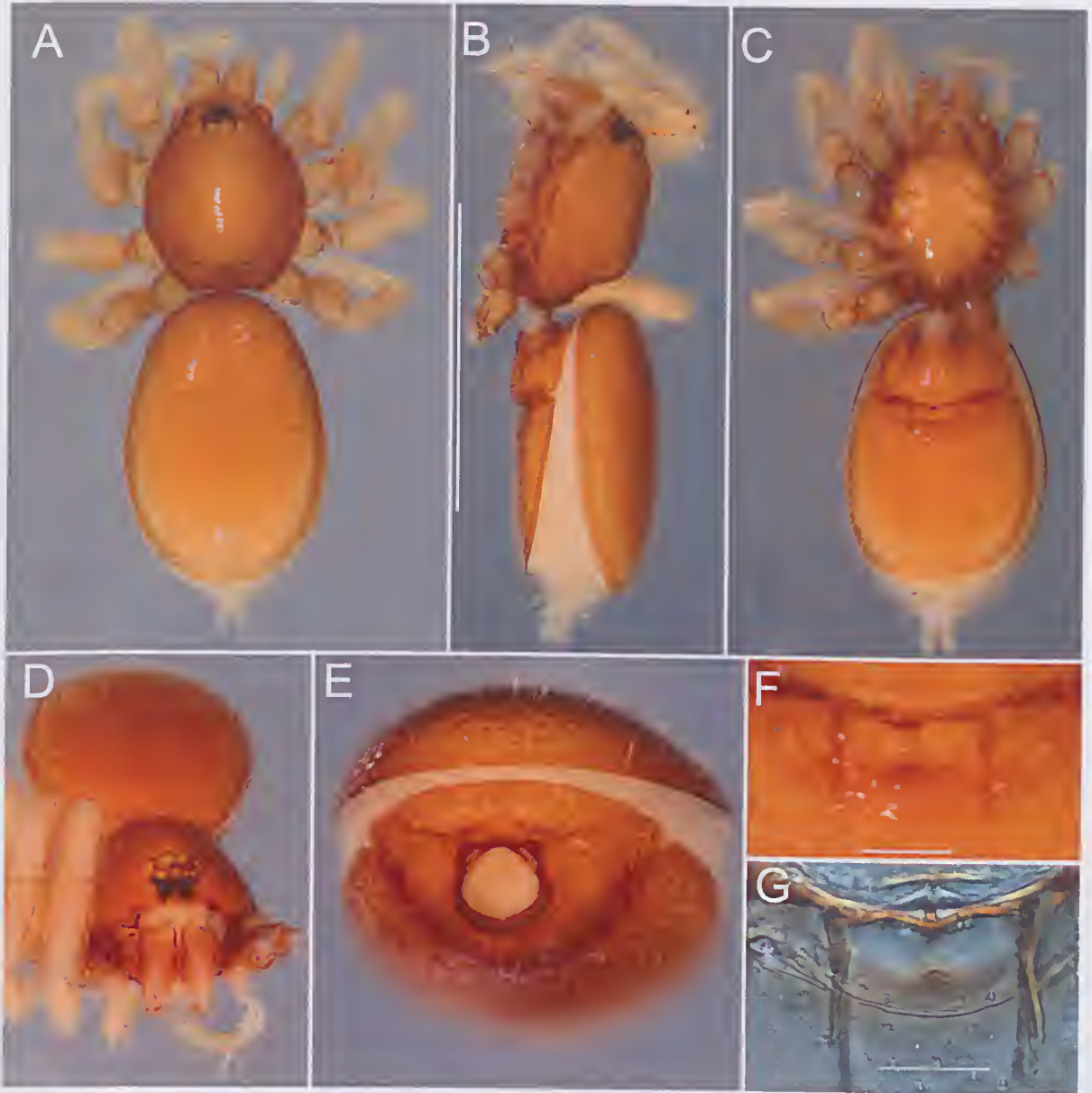


FIG. 30. *Opopaea tuberculata* Baehr, sp. nov., female (PBI_OON 23483): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

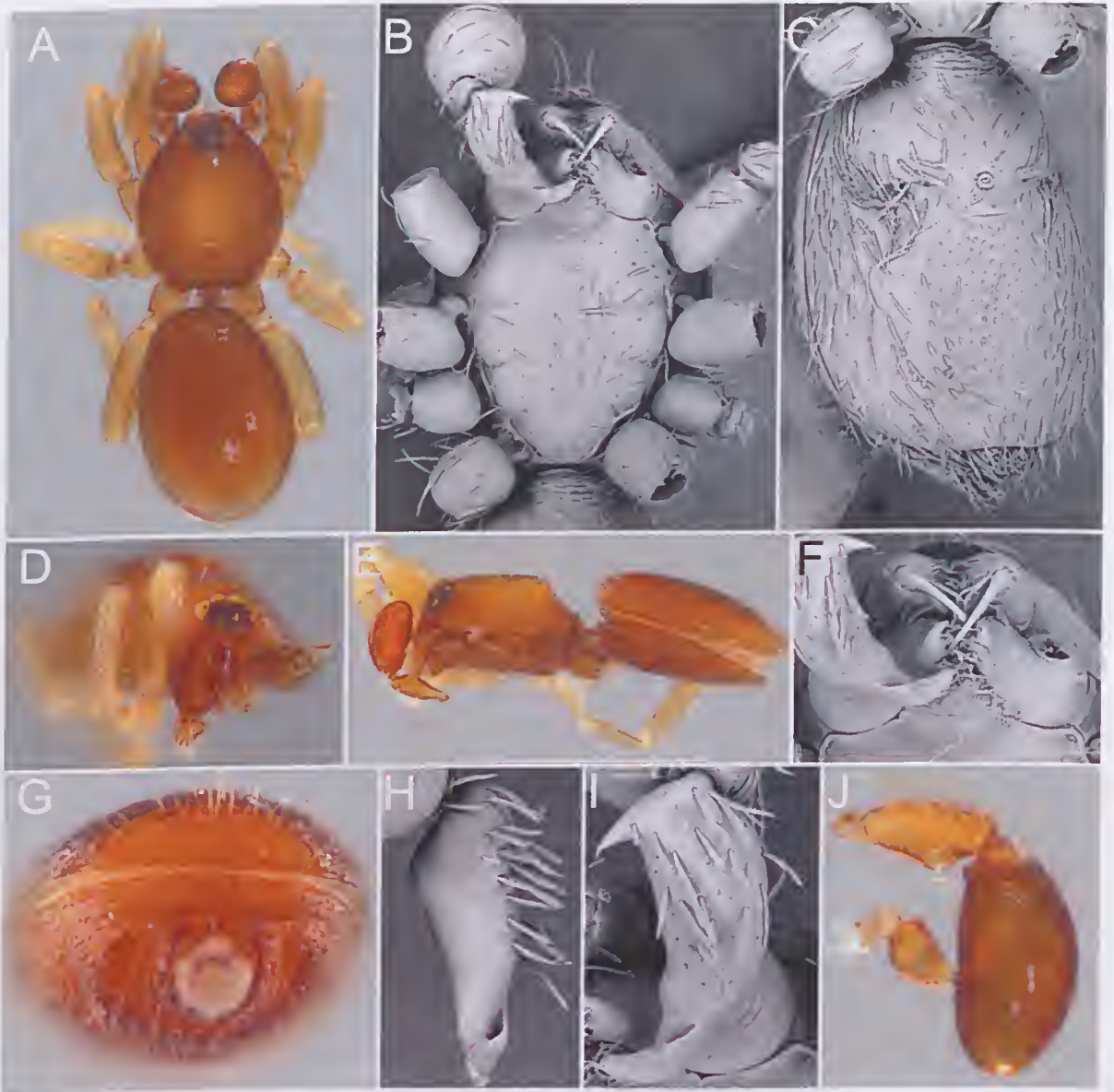


FIG. 31. *Opopaea acumiata* Baehr, sp. nov., male (PBI_OON 20477 photo, PBI_OON 20485 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 32. *Opopaea acuminata* Baehr, sp. nov., female (PBI_OON 20484): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 33. *Opopaea addisae* Baehr and Smith, sp. nov., male (PBI_OON 07704 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 34. *Opopaea addsaë* Baehr and Smith, sp. nov., female (PBI_OON 20484): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view



FIG. 35. *Opopaea bushblitz* Baehr, sp. nov., male (PBI_OON 23527 photo, PBI_OON 23529 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

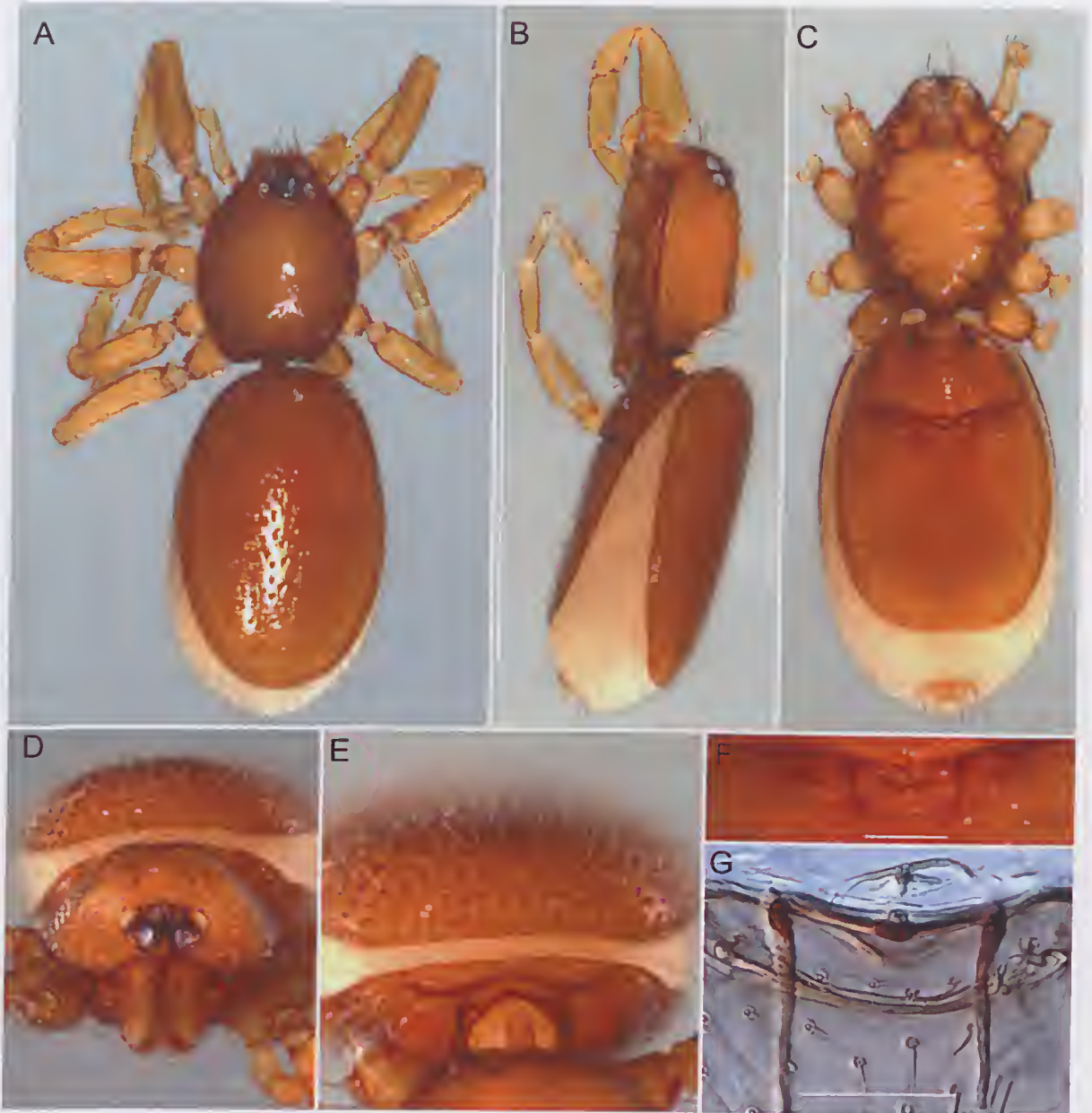


FIG. 36. *Opopaea bushblitz* Baehr, sp. nov., female (PBI_OON 23528): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view



FIG. 37. *Opopaea gerstmeieri* Baehr, sp. nov., male (PBI_OON 23608 photo, PBI_OON 07618 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, mouthparts, ventral view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 38. *Opopaea gerstmeieri* Baehr, sp. nov., female (PBI_OON 07528): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 39. *Opopaea lebretoni* Baehr, sp. nov., male (PBI_OON 20474 photo, SEM): A, habitus, dorsal view; B, prosoma, dorsal view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 40. *Opopaea lebretoni* Baehr, sp. nov., female (PBI_OON 07596): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

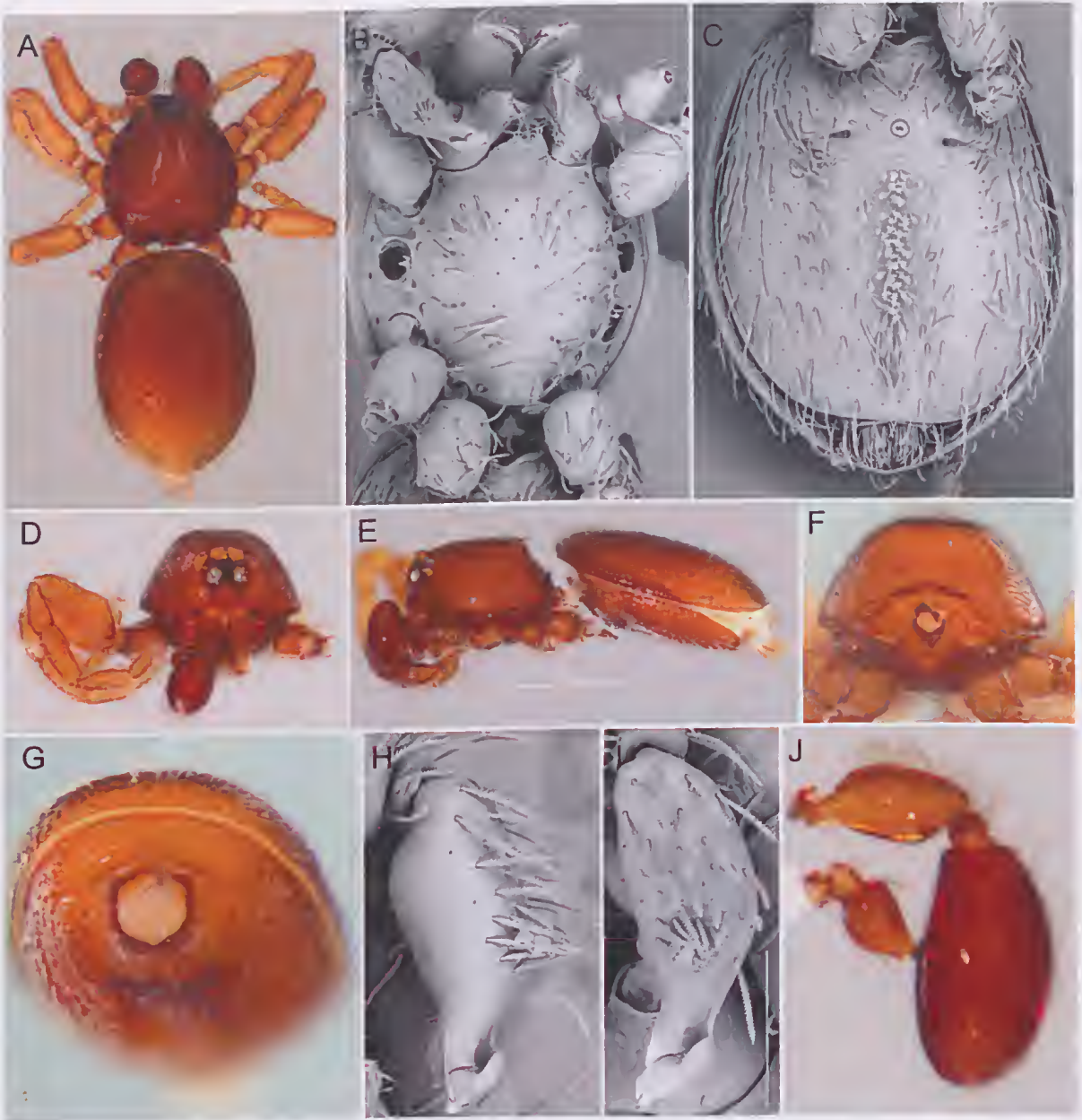


FIG. 41. *Opopaea linea* Baehr, sp. nov., male (PBI_OON 23459 photo, PBI_OON 20192 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

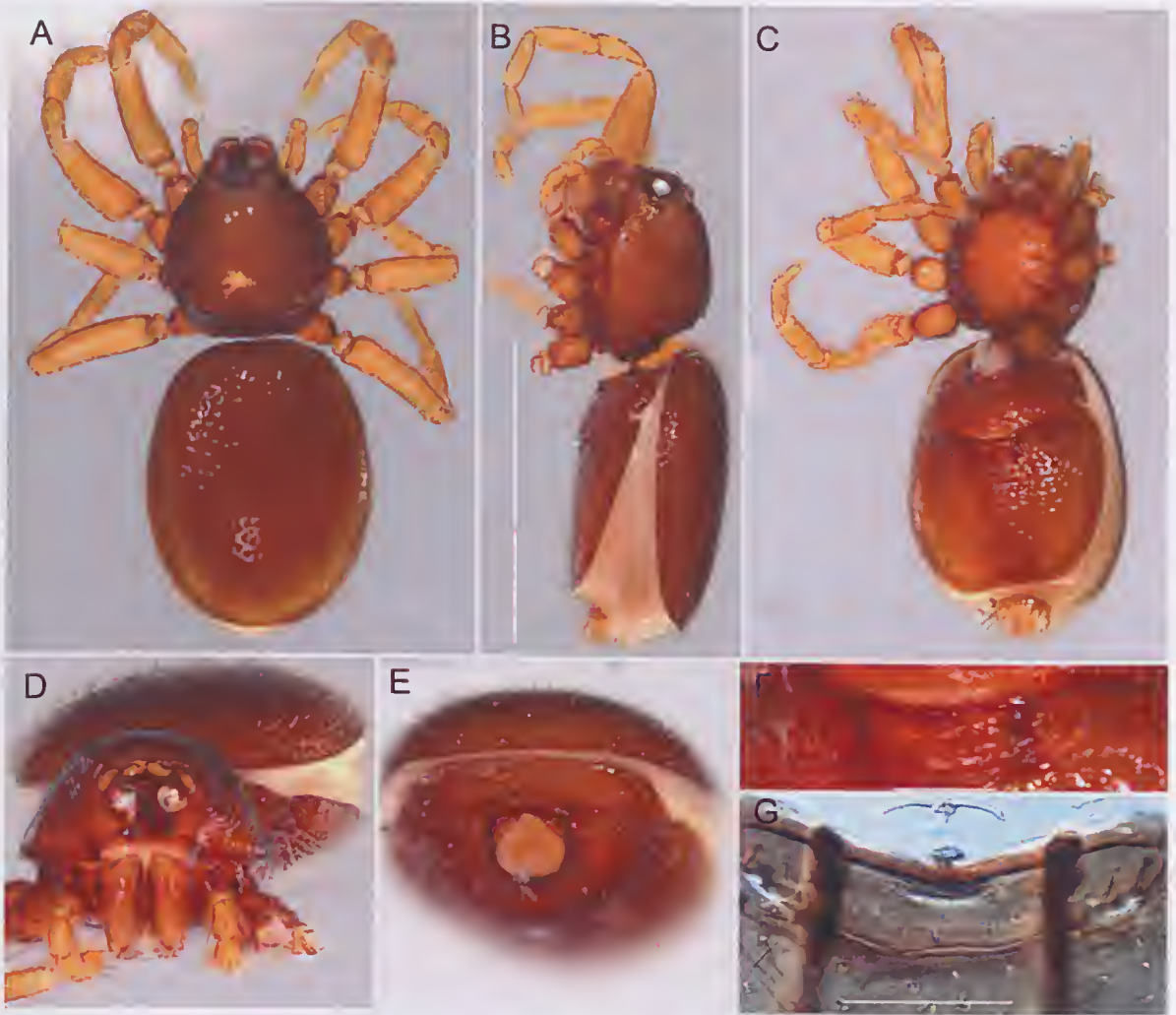


FIG. 42. *Opopaea linea* Baehr, sp. nov., female (PBI_OON 23460): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view

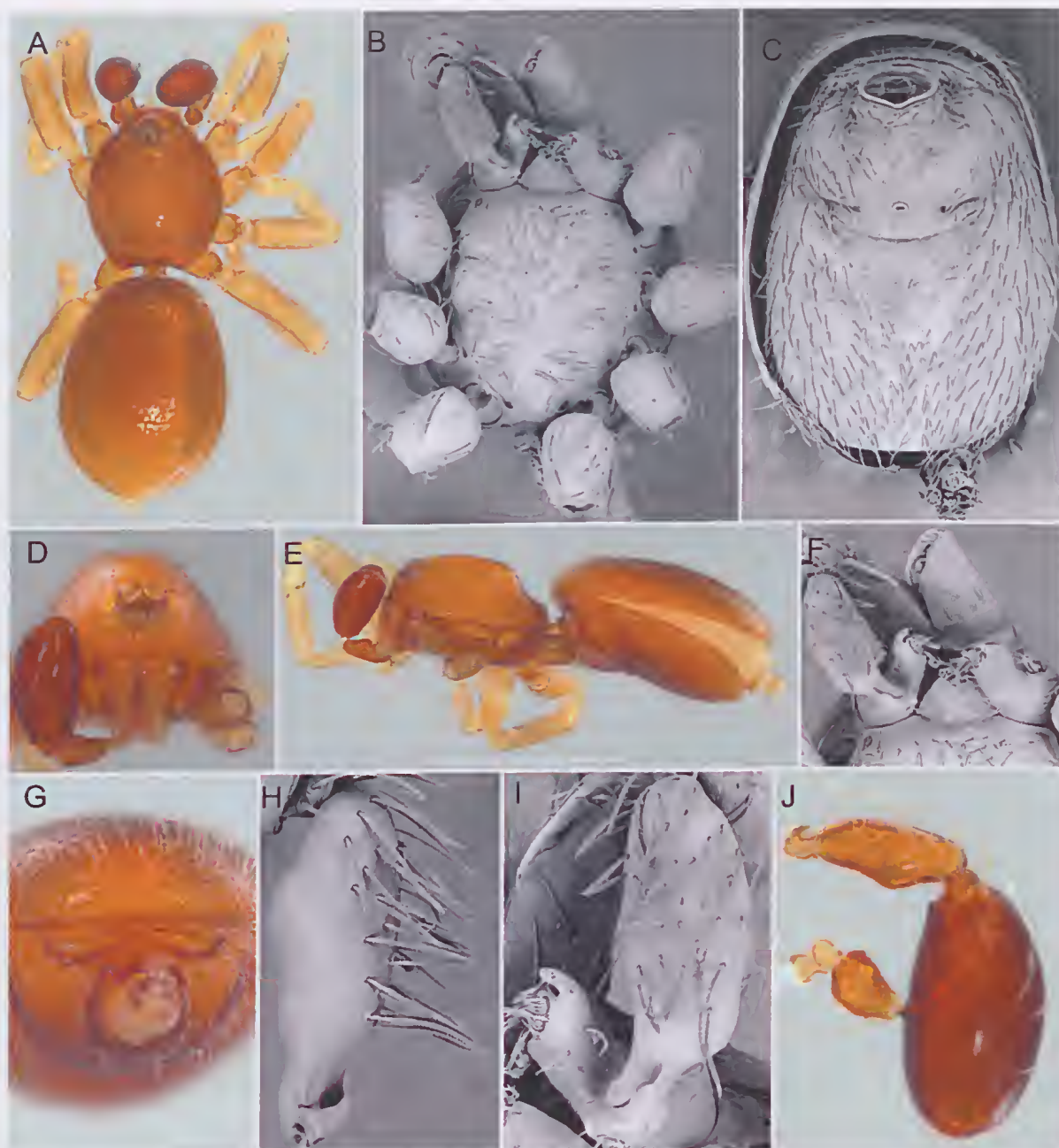


FIG. 43. *Opopaea magna* Baehr, sp. nov., male (PBI_OON 07514 photo, PBI_OON 20145 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 44. *Opopaea magna* Baehr, sp. nov., female (PBI_OON 20569): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view

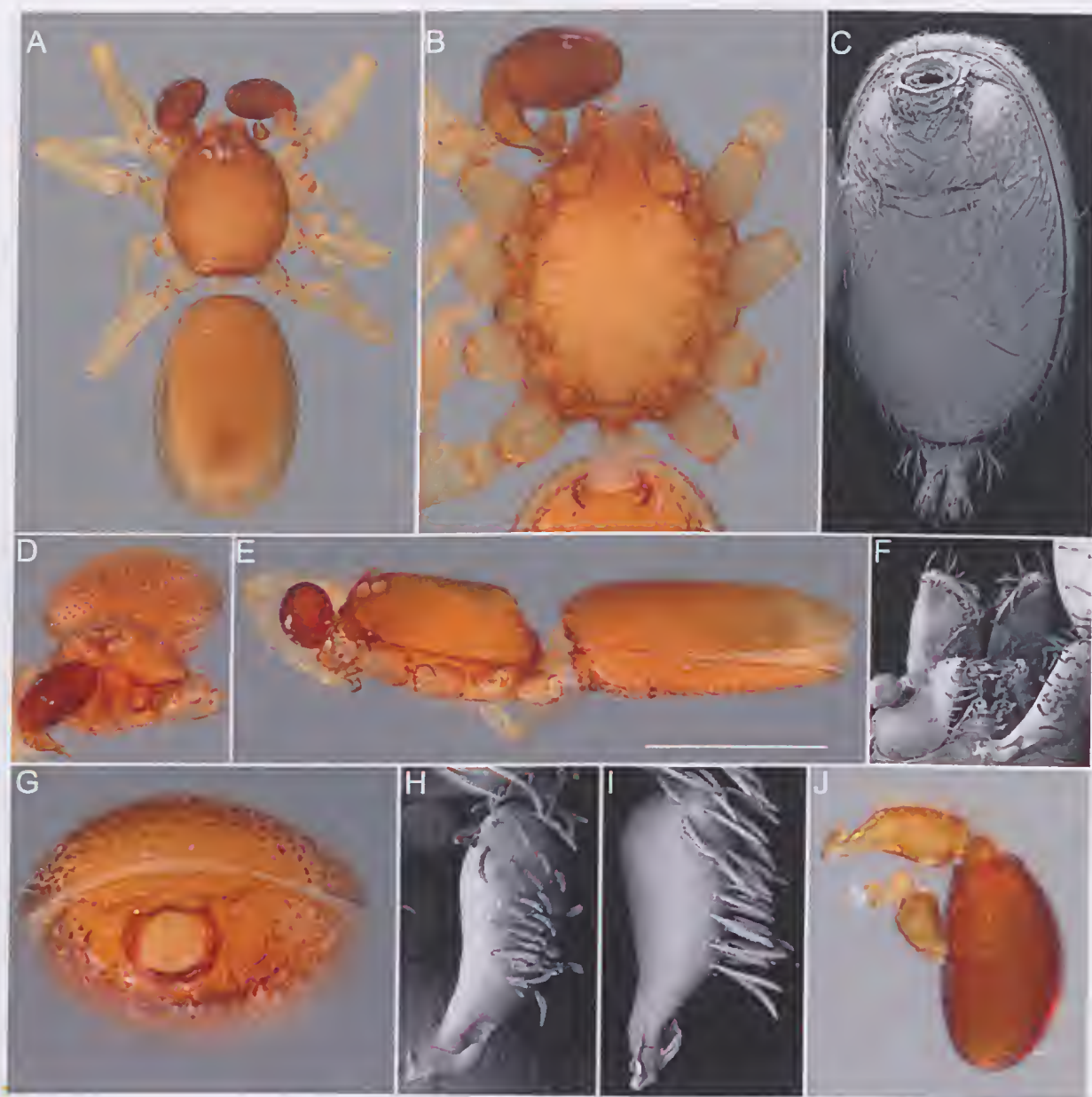


FIG. 45. *Opopaea margaretehoffmannae* Baehr, sp. nov., male (PBI_OON 20188 photo, PBI_OON 20208 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 46. *Opopaea martini* Baehr, sp. nov., male (PBI_OON 20576 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, spinnerets, ventral view; I, male palp, prolateral view; J, same, dorsal view; K, same, retrolateral view.

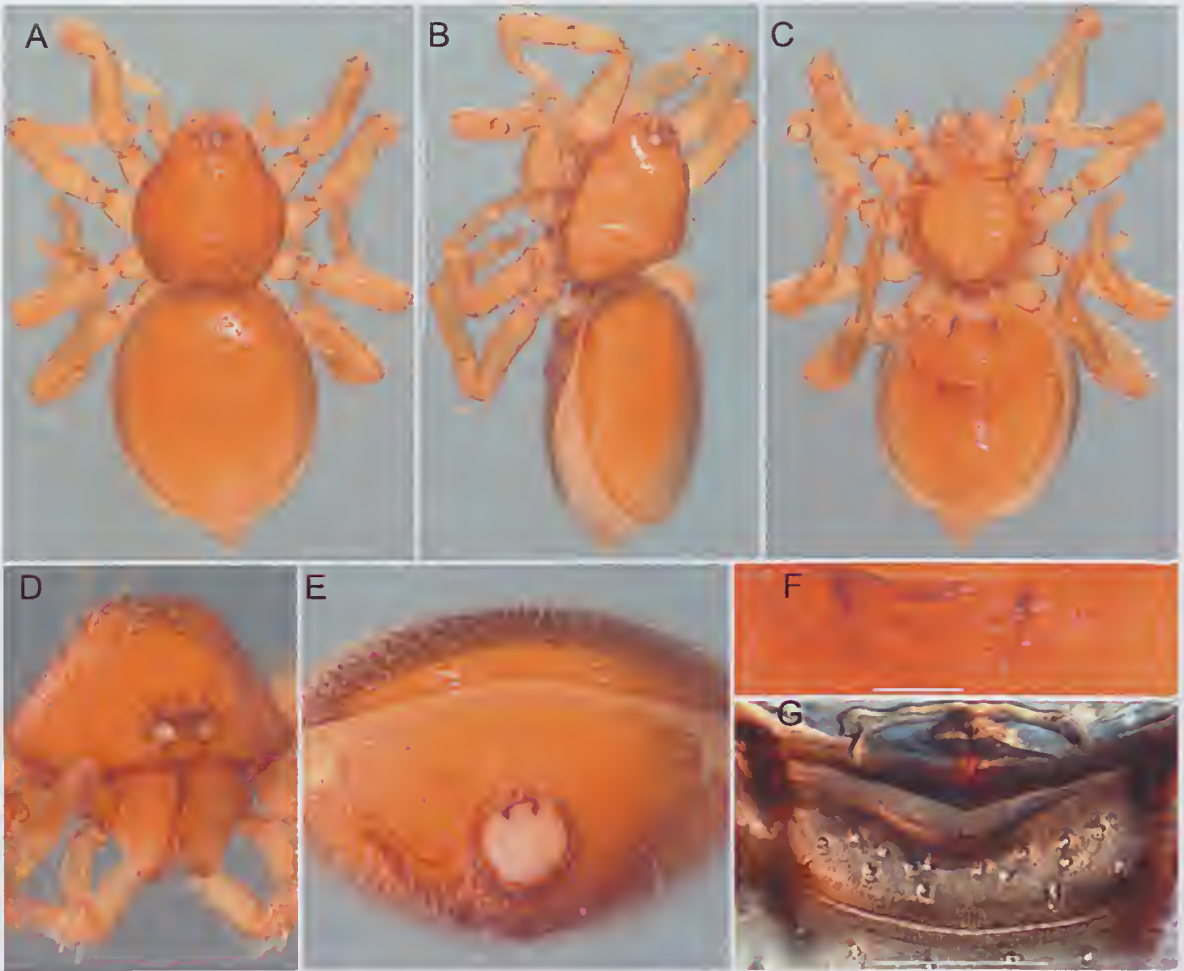


FIG. 47. *Opopaea martini* Baehr, sp. nov., female (PBI_OON 07628): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 48. *Opopaea michaeli* Baehr and Smith, sp. nov., male (PBI_OON 20204 photo, PBI_OON 20207 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

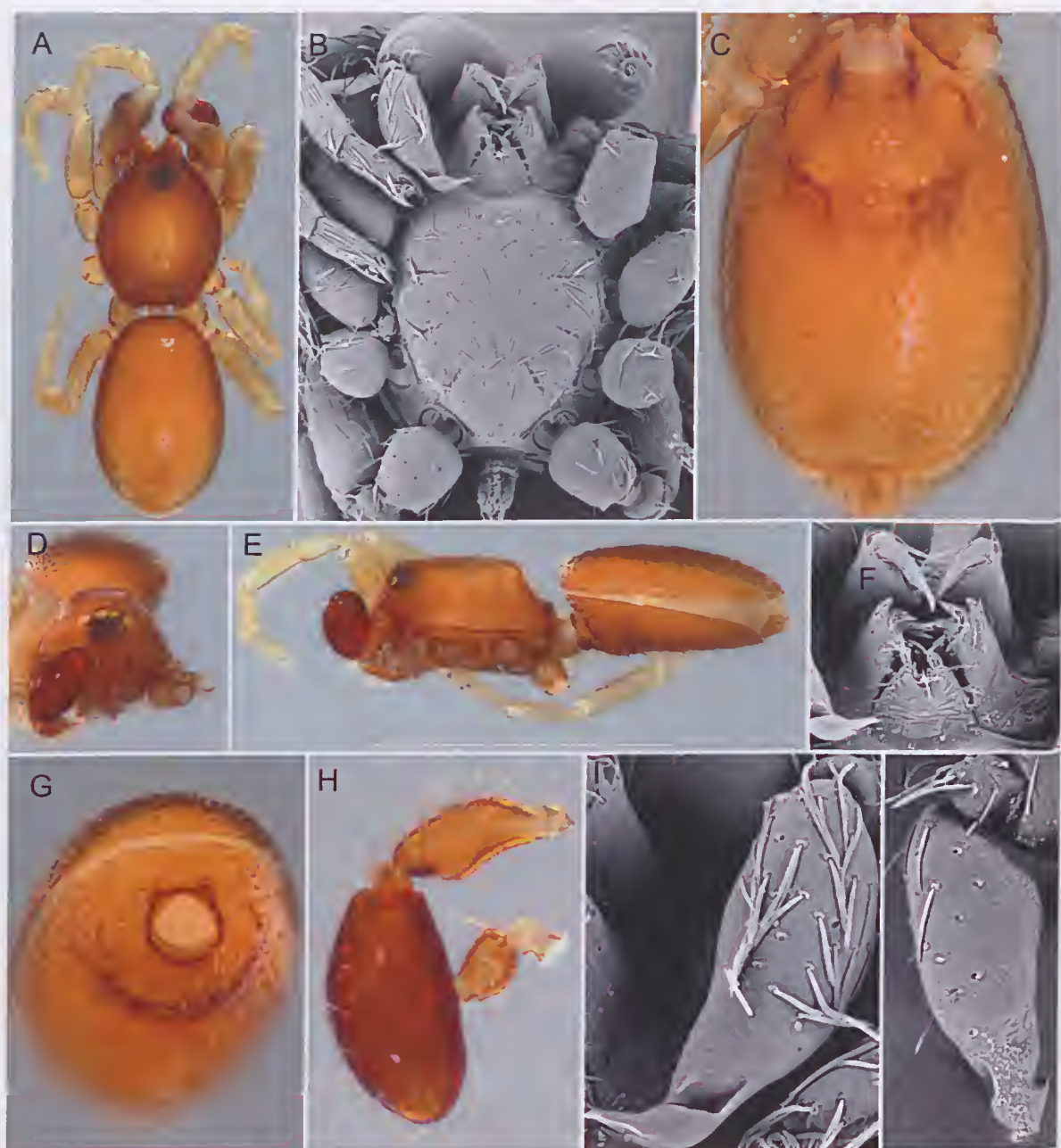


FIG. 49. *Opopaea uilledgei* Baehr, sp. nov., male (PBI_OON 20478 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 50. *Opopaea milledgei* Baehr, sp. nov., female (PBI_OON 23604): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view (PBI_OON 19364).

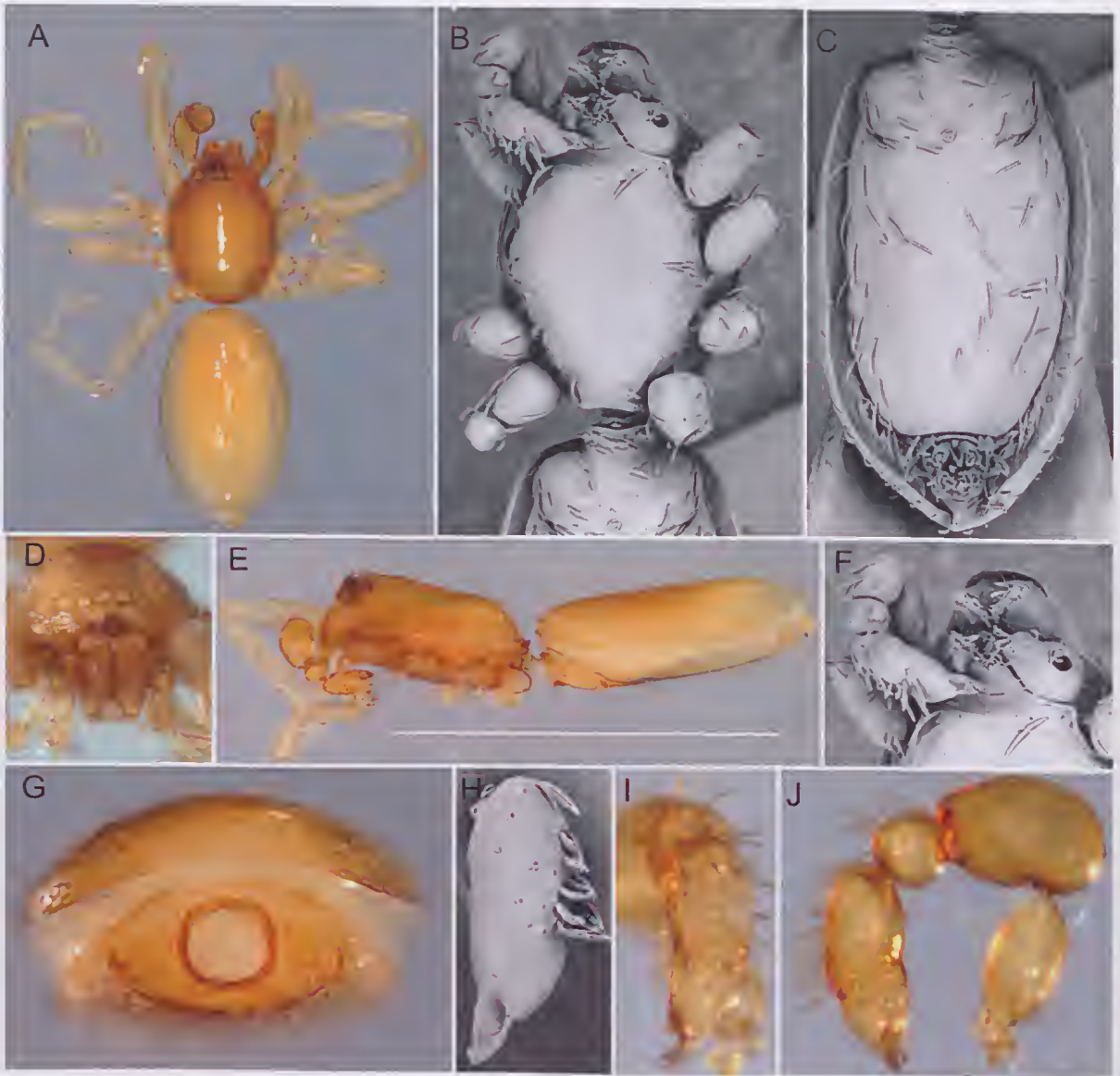


FIG. 51. *Opopaea nitens* Baehr, sp. nov., male (PBI_OON 21190 photo, PBI_OON 07763 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

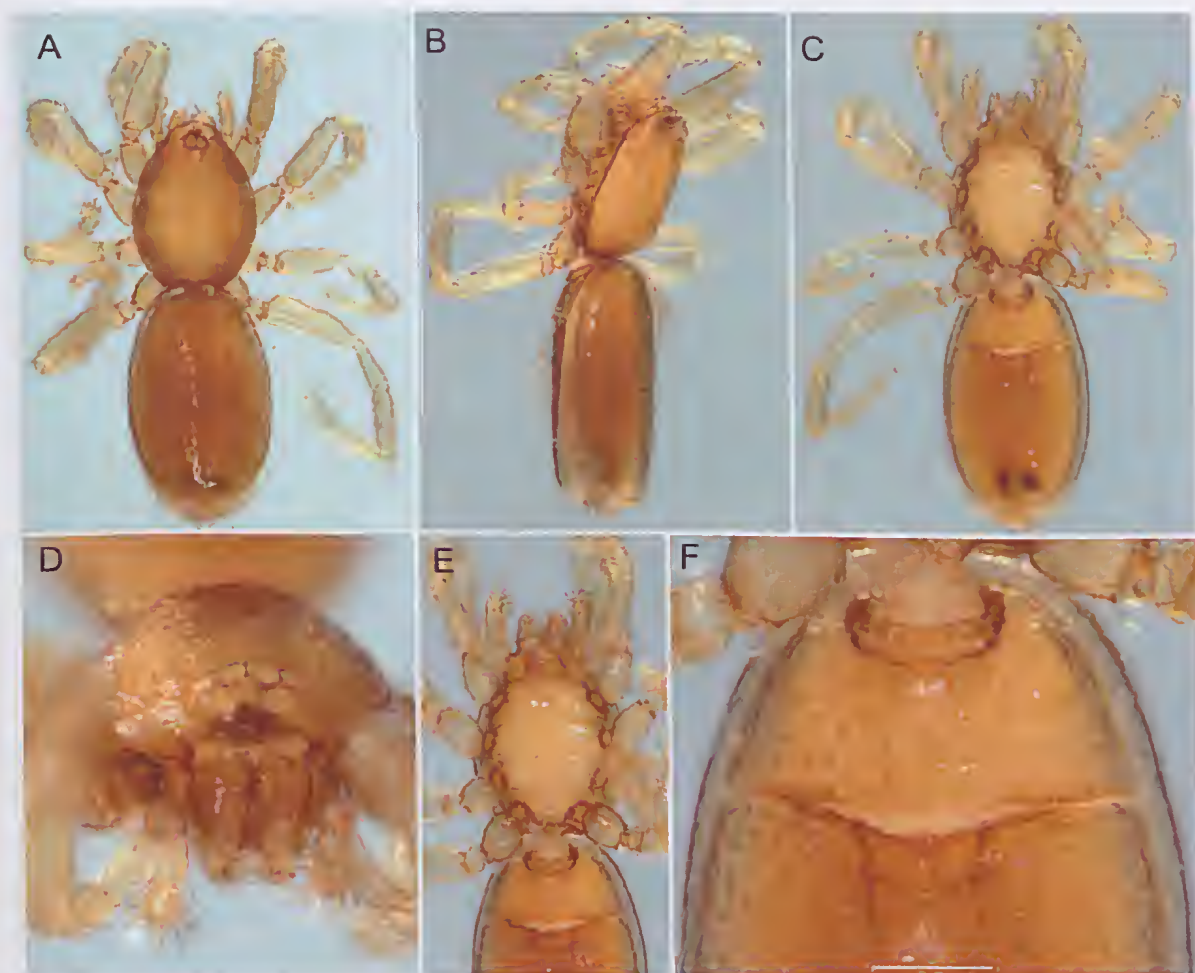


FIG. 52. *Opopaea nitens* Baehr, sp. nov., female (PBI_OON 07737): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, prosoma, ventral view; F, female epigyne, ventral view.

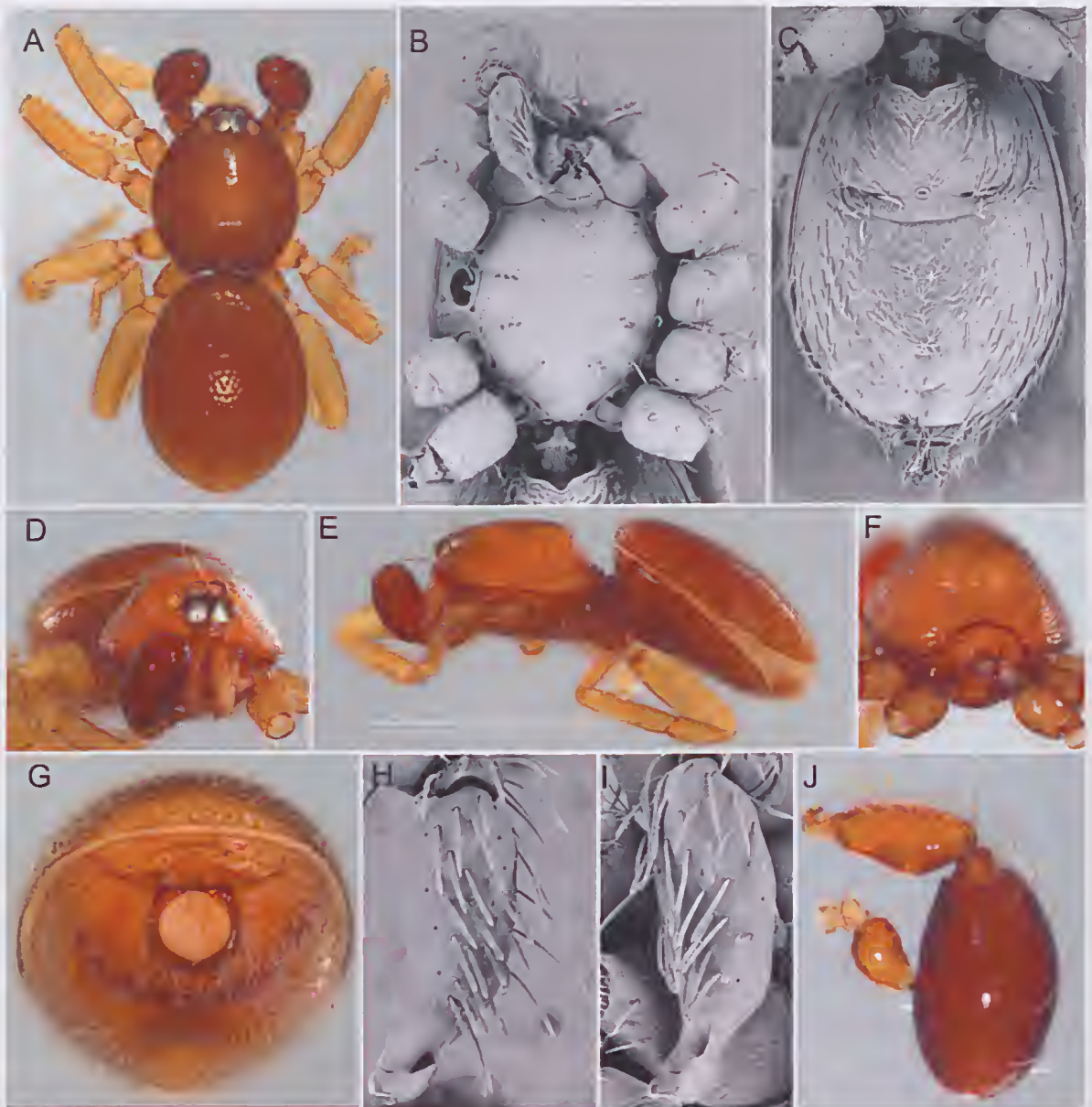


FIG. 53. *Opopaea ottoï* Baehr, sp. nov., male (PBI_OON 19282 photo, PBI_OON 19227 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

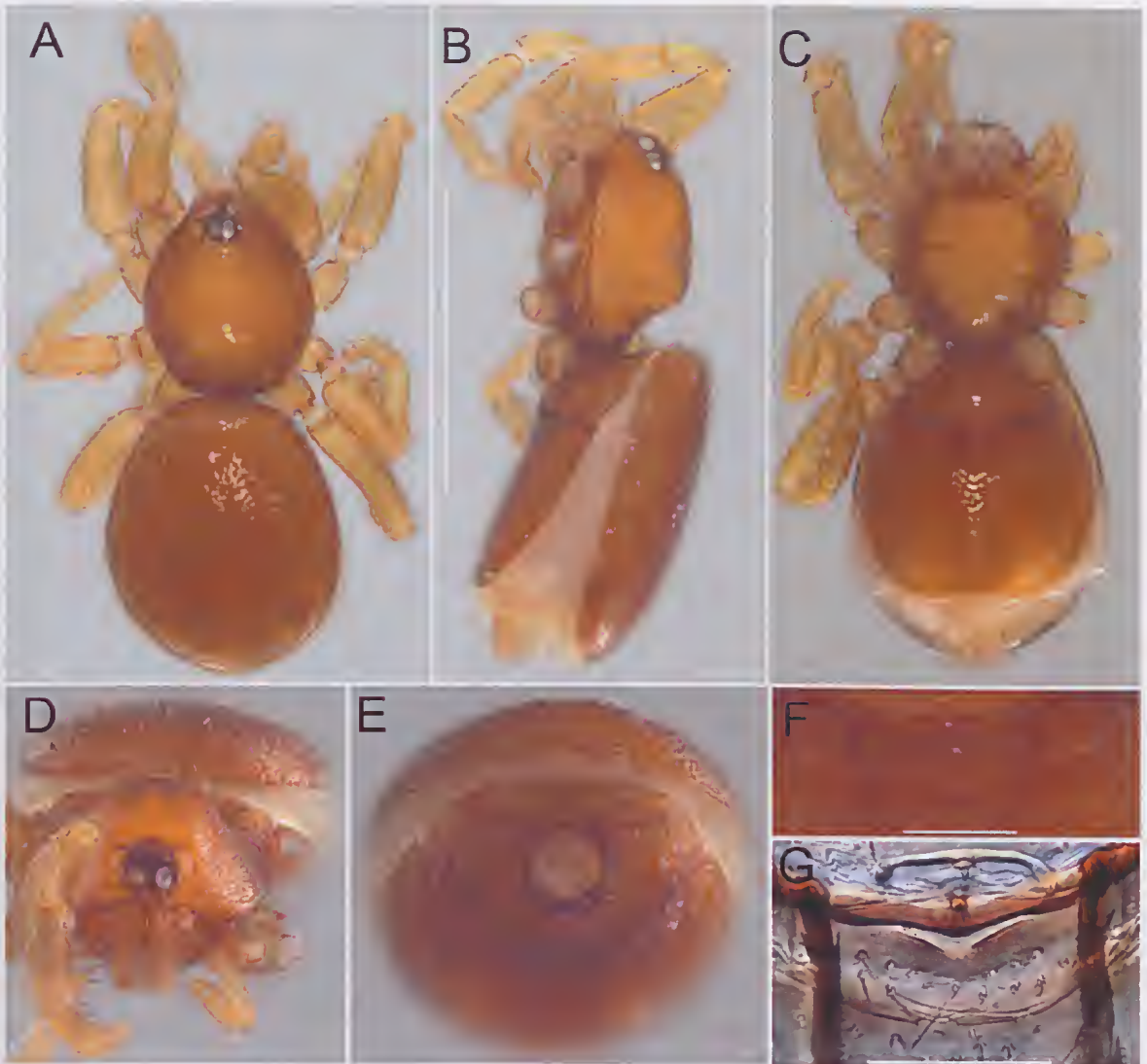


FIG. 54. *Opopaea otto* Baehr, sp. nov., female (PBI_OON 23606): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

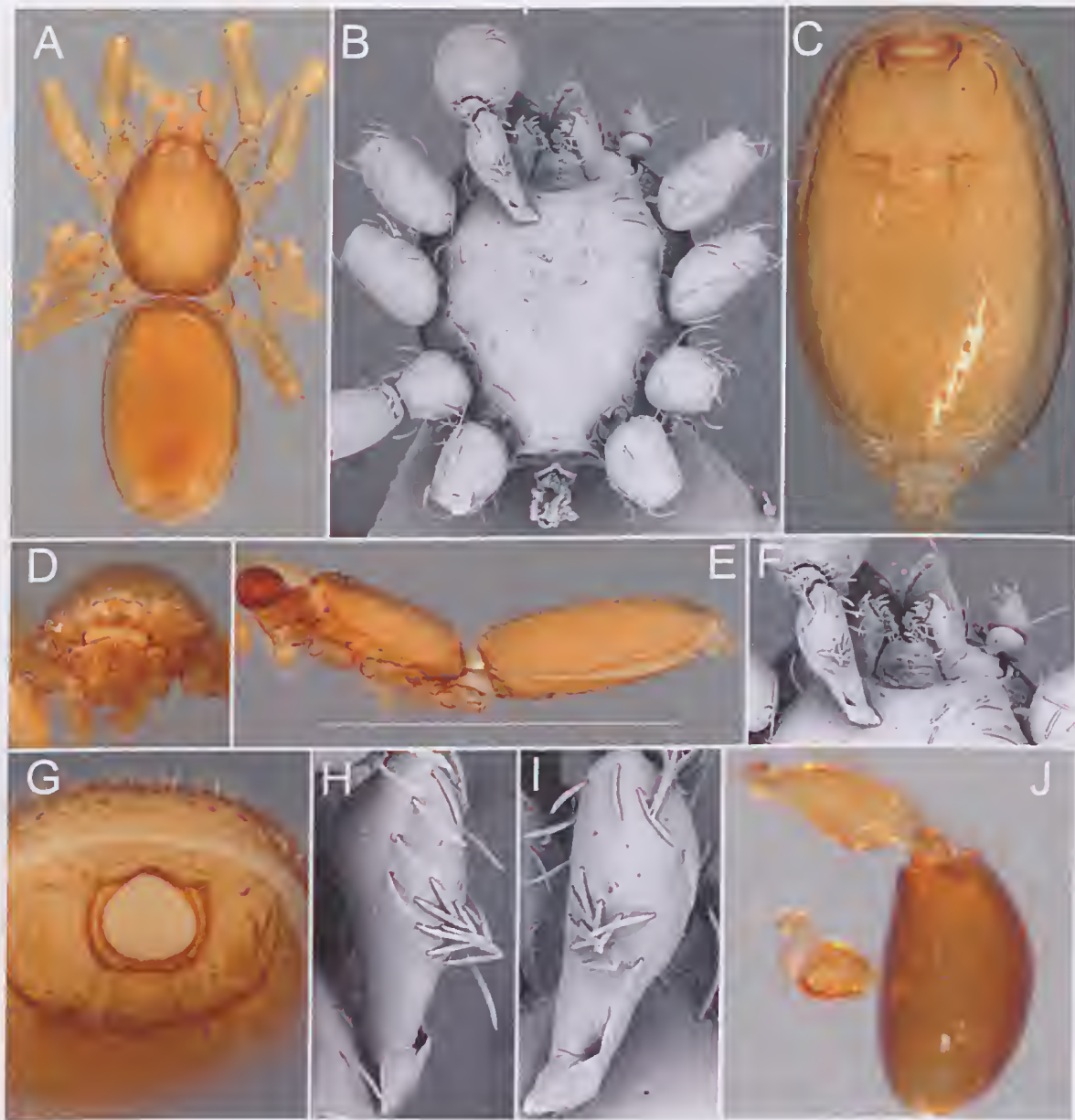


FIG. 55. *Opopaea plana* Baehr, sp. nov., male (PBI_OON 19575 photo, PBI_OON 19579 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

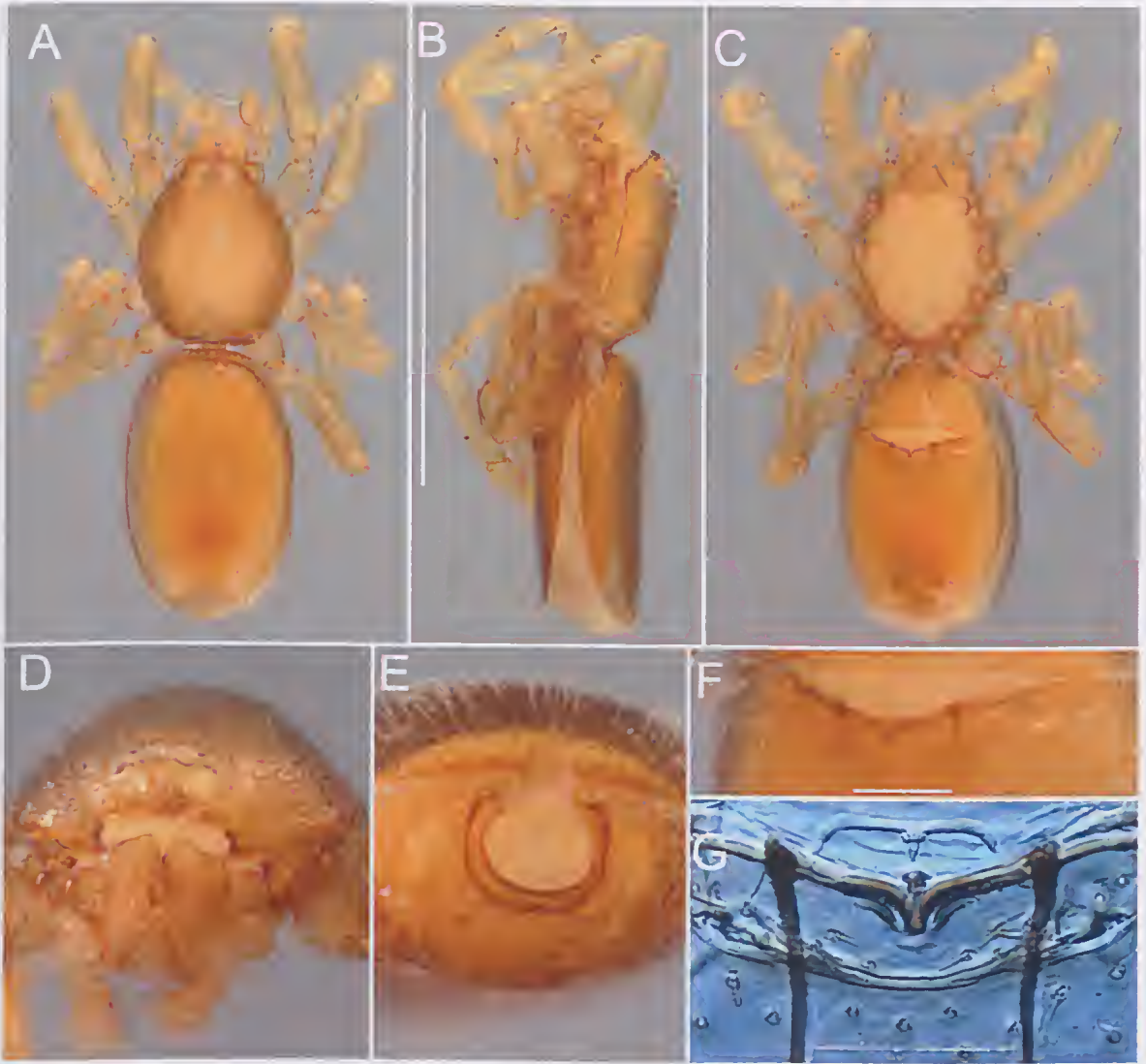


FIG. 56. *Opopaea plana* Baehr, sp. nov., female (PBI_OON 19577): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

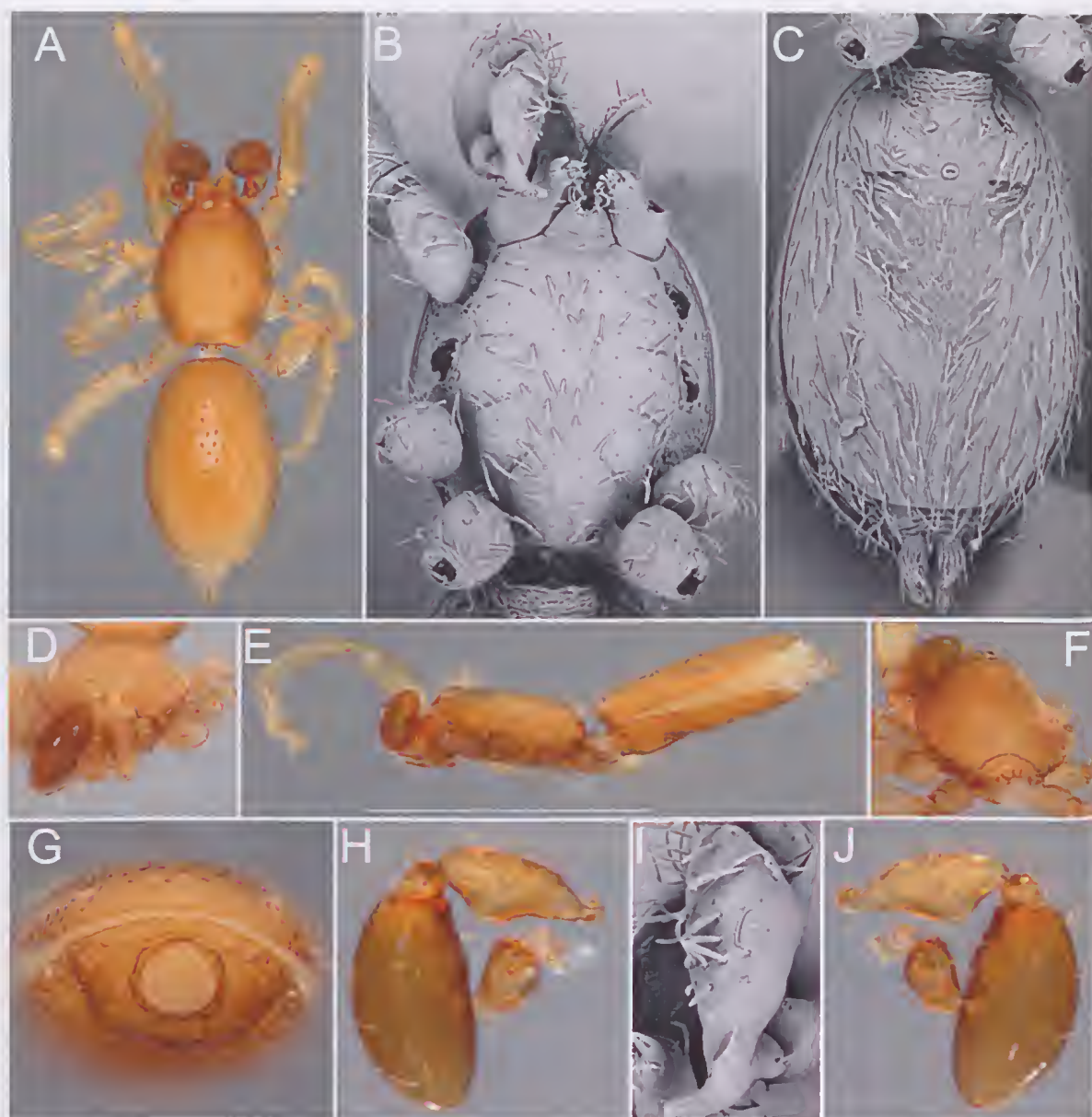


FIG. 57. *Opopaea simplex* Baehr, sp. nov., male (PBI_OON 19589 photo, PBI_OON 19562 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 58. *Opopaea simplex* Baehr, sp. nov., female (PBI_OON 19560): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

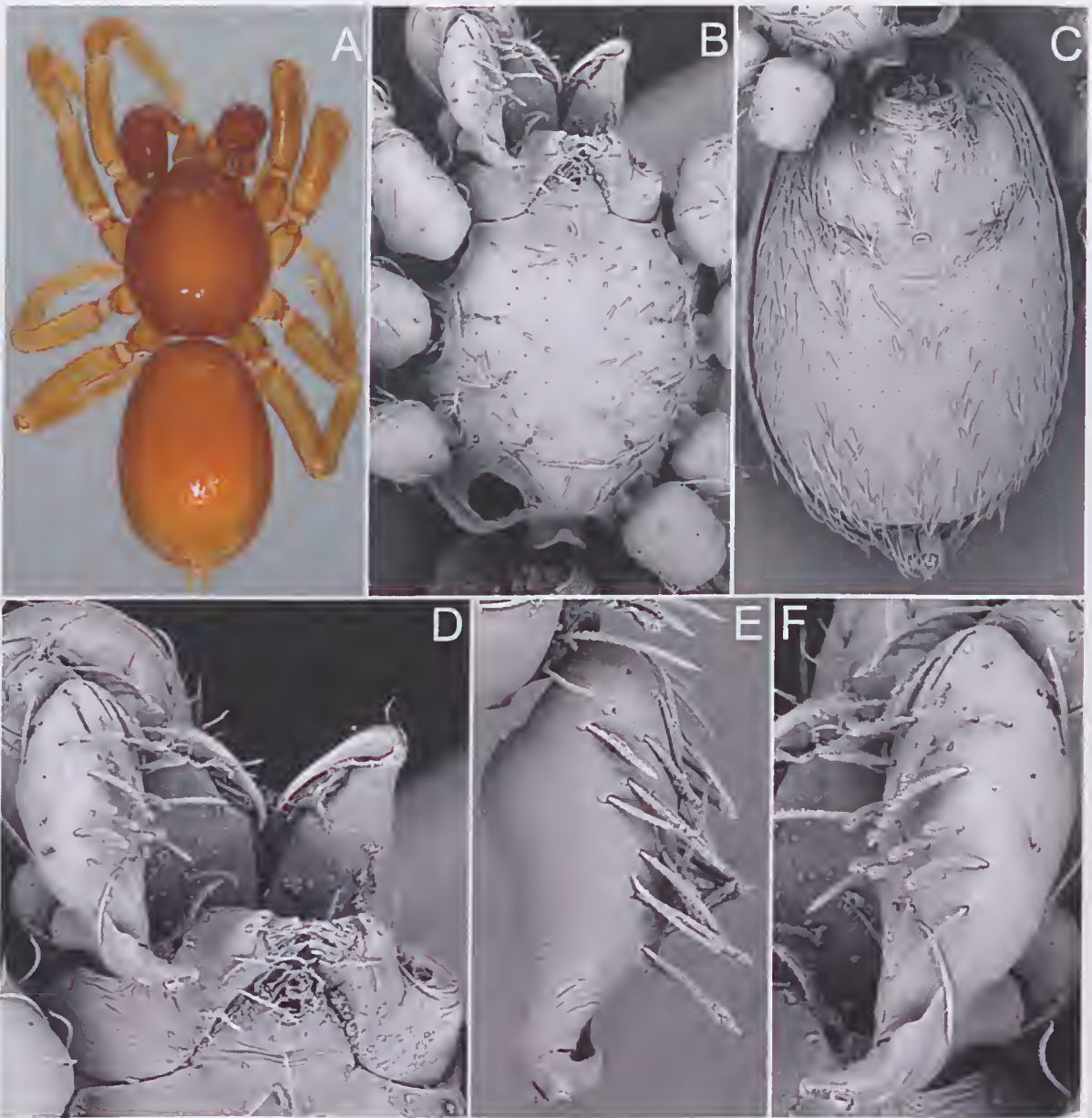


FIG. 59. *Opopaea sown* Baehr, 2011, male (PBI_OON 19252 photo, PBI_OON 19274 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, mouthparts, ventral view; E, male palp, prolateral view; F, same, dorsal view.



FIG. 60. *Opopaea sturt* Baehr, sp. nov., male (PBI_OON 20189 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 61. *Opopaea suelewisae* Baehr and Smith, sp. nov., male (PBI_OON 19804 photo, PBI_OON 19788 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

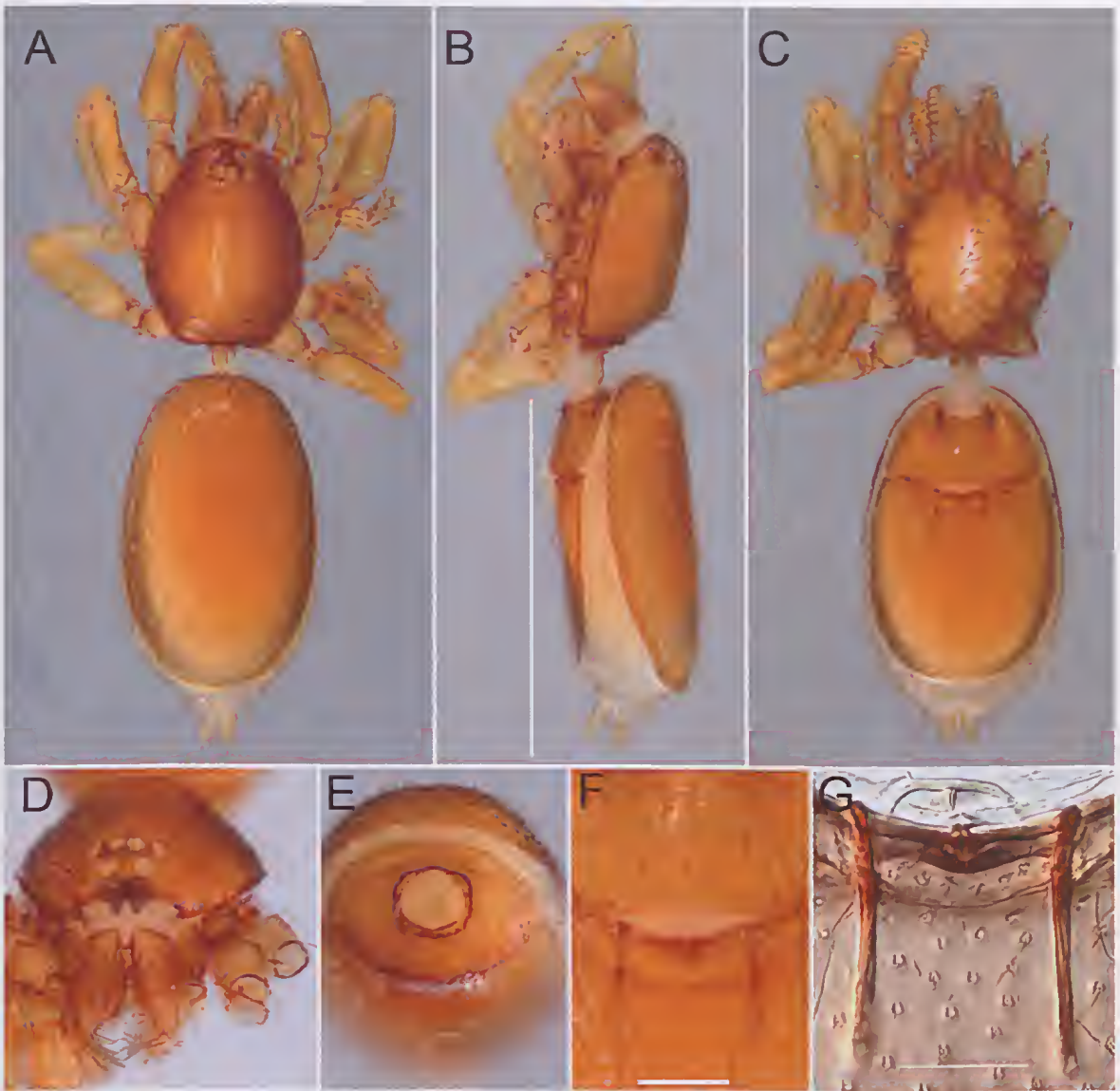


FIG. 62. *Opopaea suelewisae* Baehr and Smith, sp. nov., female (PBI_OON 19790): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 63. *Opopnea sylvestrella* Baehr and Smith, sp. nov., male (PBI_OON 20285 photo, PBI_OON 20186 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

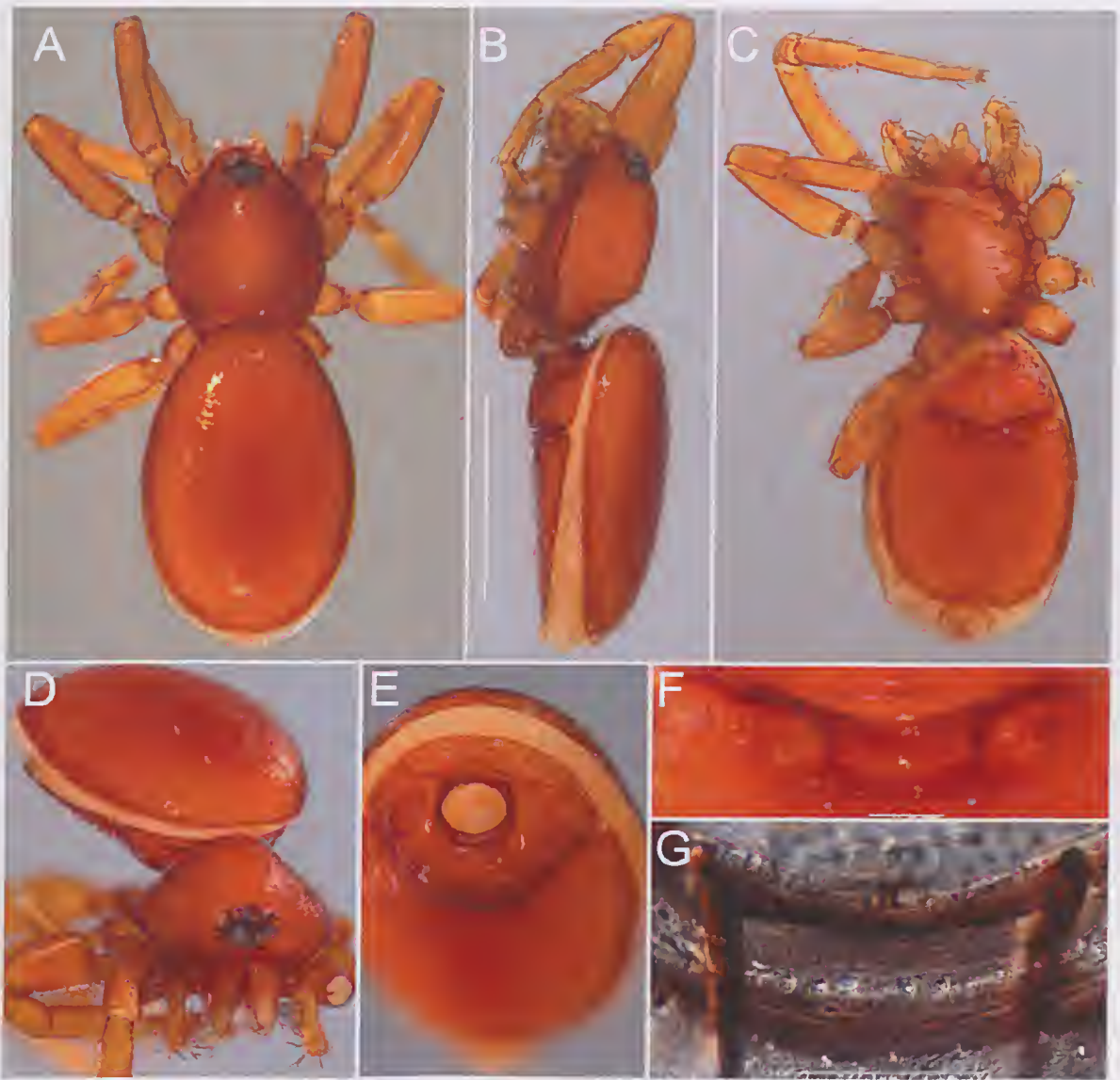


FIG. 64. *Opopaea sylvestrella* Baehr and Smith, sp. nov., female (PBI_OON 23550): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

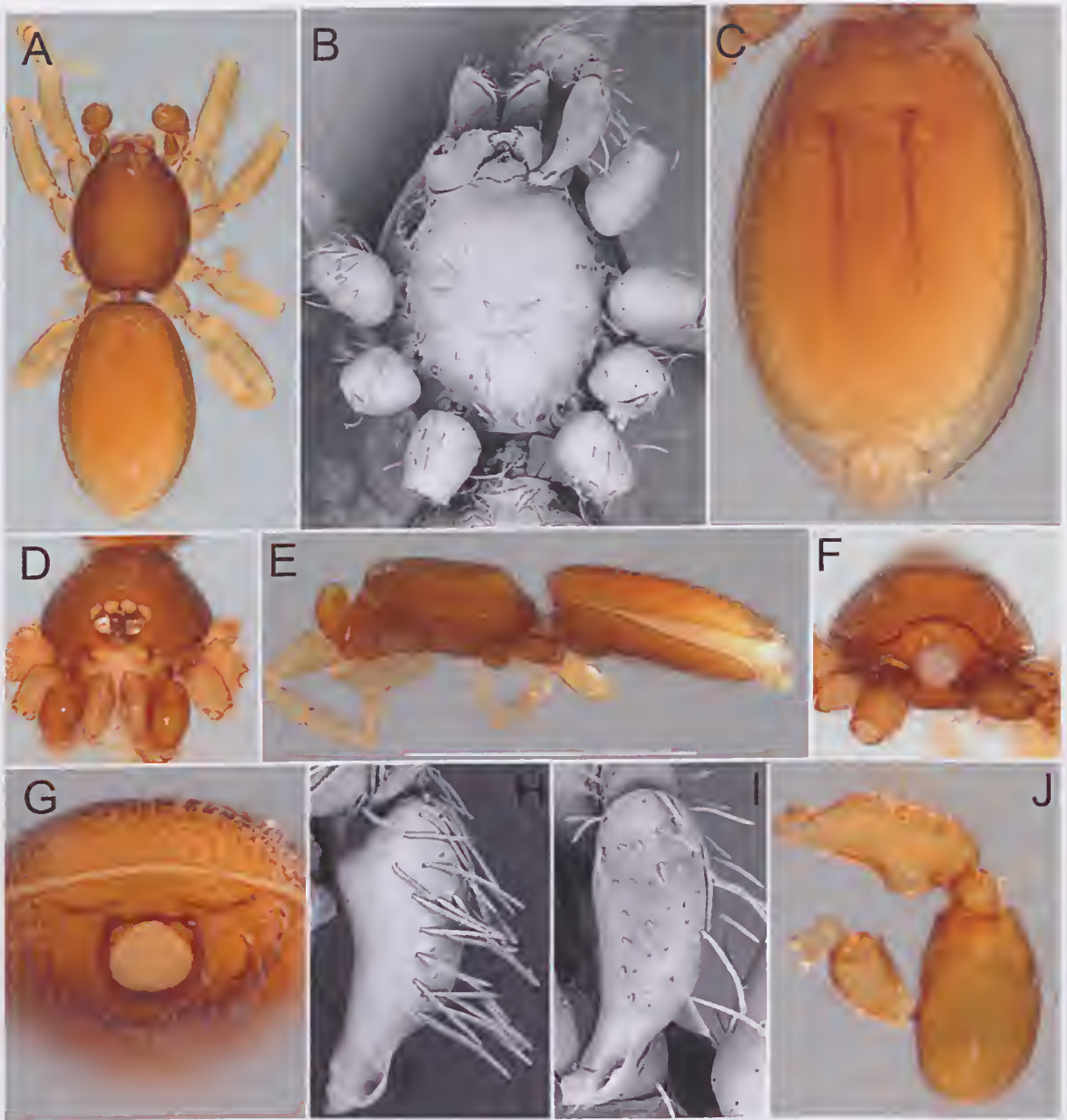


FIG. 65. *Opopaea tenuis* Baehr, sp. nov., male (PBI_OON 07902 photo, PBI_OON 07903 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 66. *Opopaea tenuis* Baehr, sp. nov., female (PBI_OON 07903): **A**, habitus, dorsal view; **B**, same, lateral view; **C**, same, ventral view; **D**, prosoma, anterior view; **E**, opisthosoma, anterior view; **F**, female epigyne, ventral view; **G**, same, dorsal view.

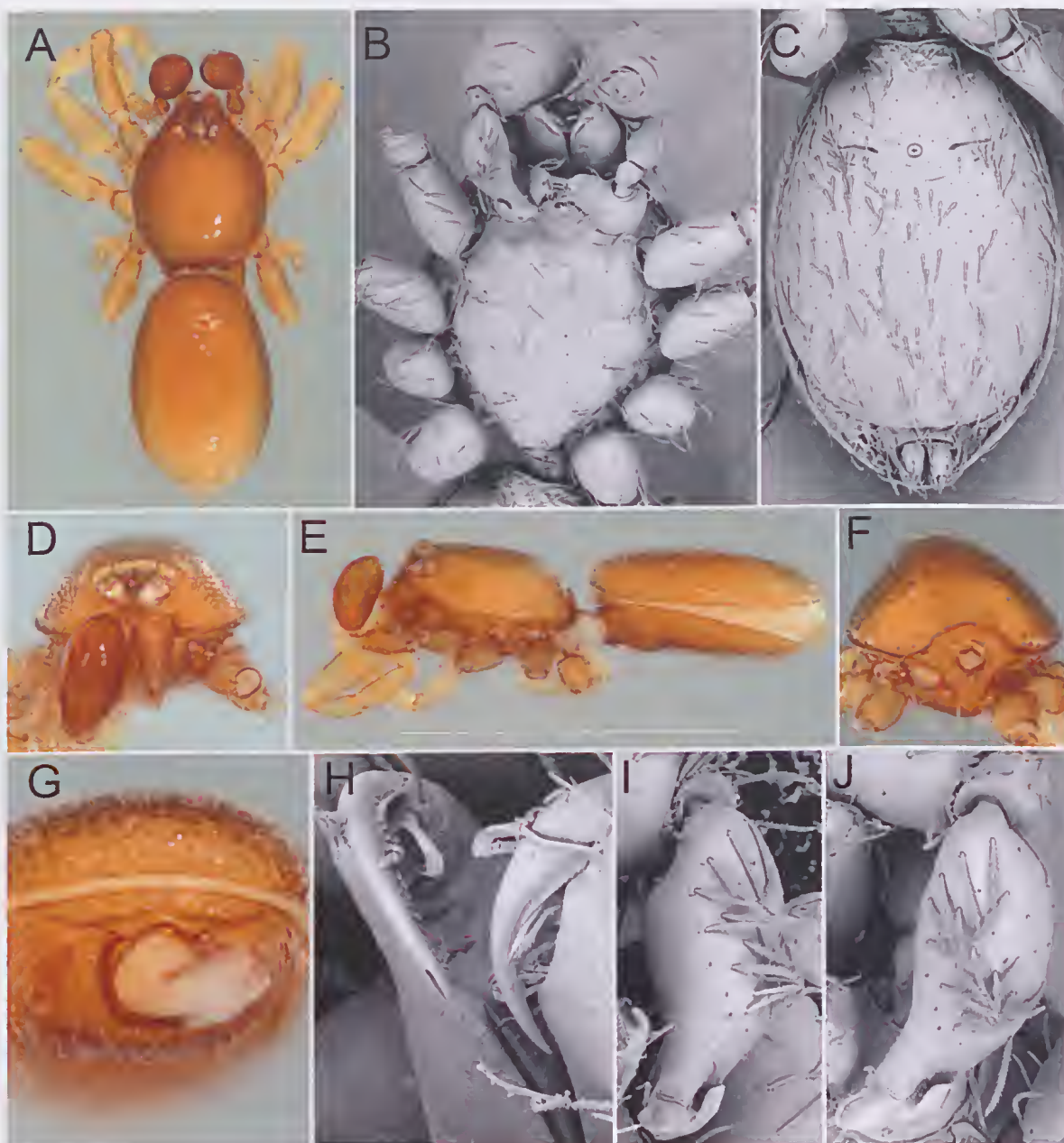


FIG. 67. *Opopaea ursulae* Baehr, sp. nov., male (PBI_OON 20184 photo, PBI_OON 20183 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, Cheliceral fangs, lateral view; I, male palp, prolateral view; J, same, dorsal view.

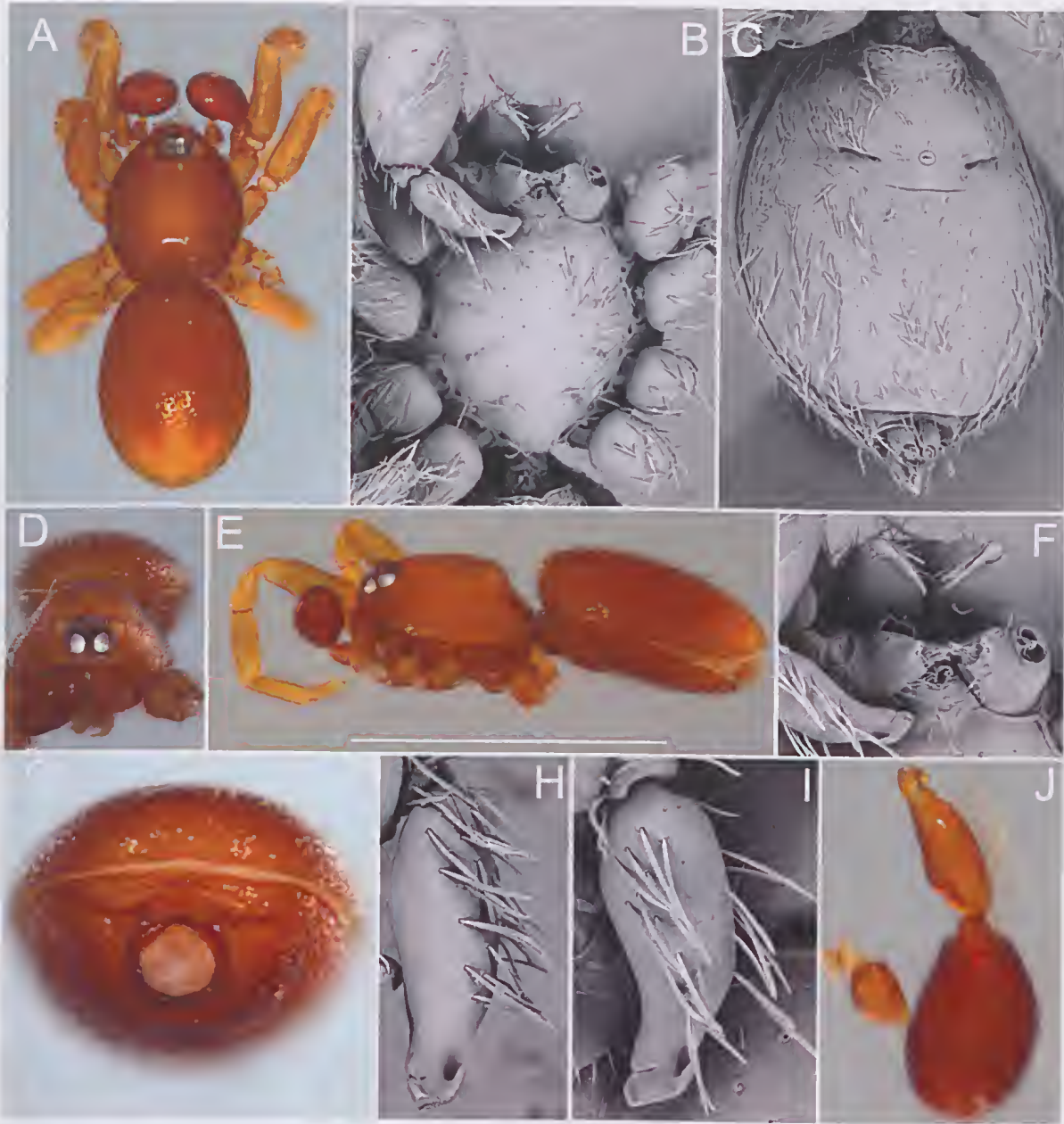


FIG. 68. *Opopaea yorki*, sp. nov., male (PBI_OON 19273 photo, PBI_OON 23531 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

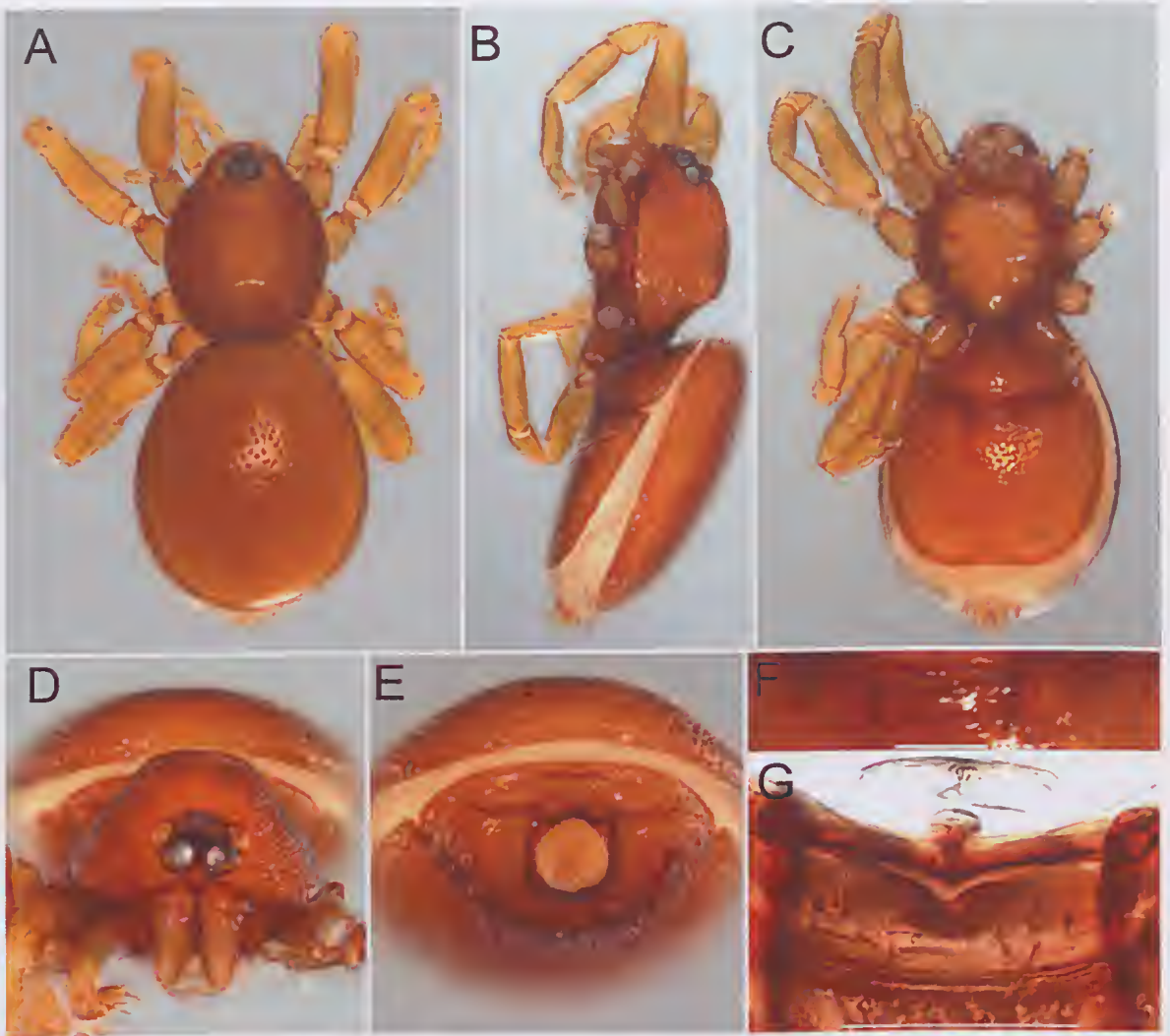


FIG. 69. *Opopaea yorki* Baehr, sp. nov., female (PBI_OON 19318): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 70. *Opopaea ephemera* Baehr, sp. nov., male (PBI_OON 23644 photo, PBI_OON 23645 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 71. *Opopaea fishriver* Baehr, sp. nov., male (PBI_OON 23641 photo, PBI_OON 23643 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 72. *Opopaea fishriver*, sp. nov., female (PBI_OON 23642): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 73. *Opopaea gilliesi* Baehr, sp. nov., male (PBI_OON 23658 photo, PBI_OON 23660 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 74. *Opopaea gilliesi* Baehr, sp. nov., female (PBI_OON 23559): A, habitus, dorsal view; B, same, lateral view; C, prosoma, posterior view; D, opisthosoma, ventral view; E, prosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view.



FIG. 75. *Opopaea johardinae* Baehr, sp. nov., male (PBL_OON 23652): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 76. *Opopaea preecei* Baehr, sp. nov., male (PBI_OON 23649 photo, PBI_OON 23650 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 77. *Opopaea preecei* Baehr, sp. nov., female (PBI_OON 23650): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, opisthosoma, ventral view; E, prosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.

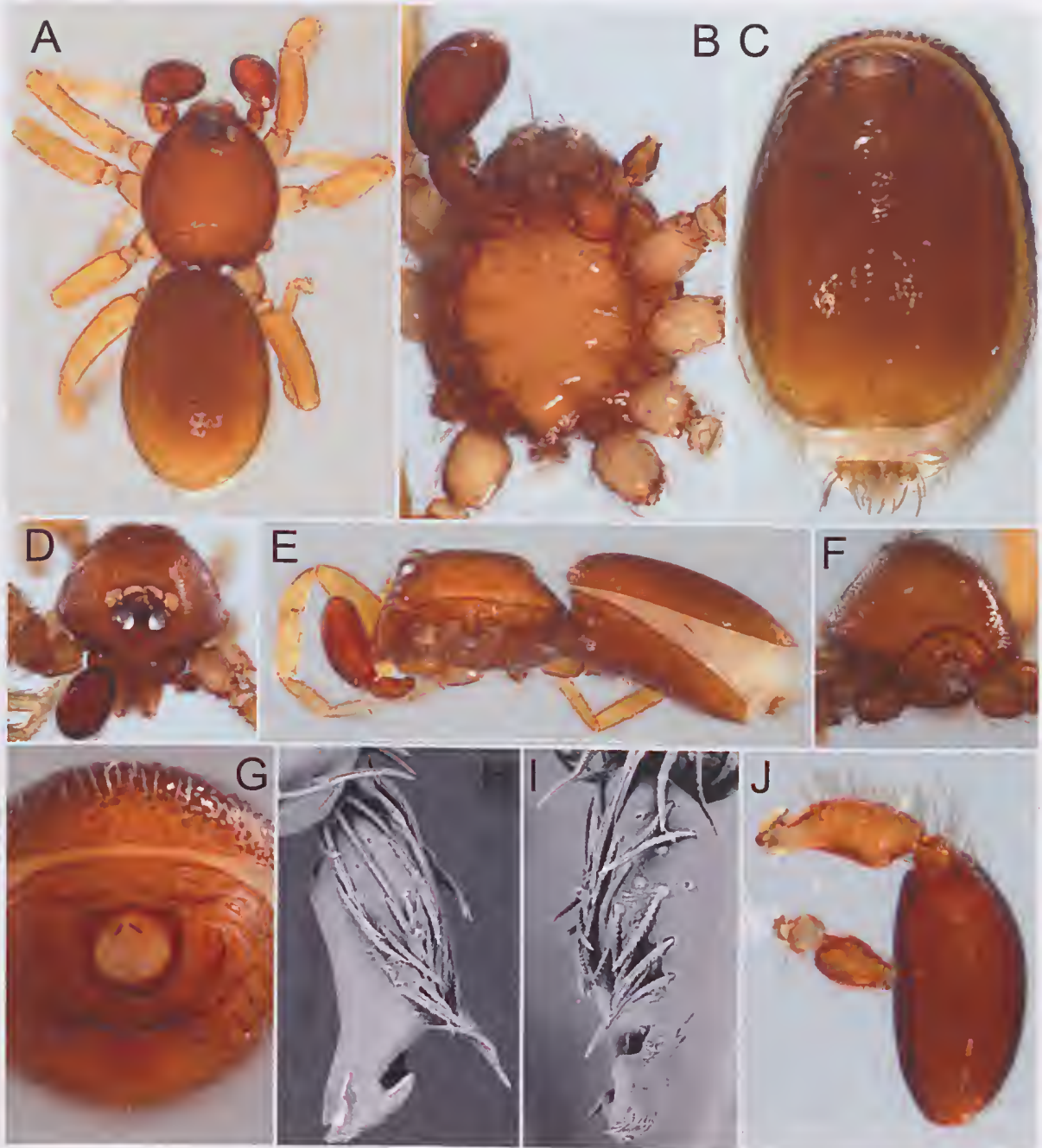


FIG. 78. *Opopaea wongalara* Baehr, sp. nov., male (PBI_OON 23657 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

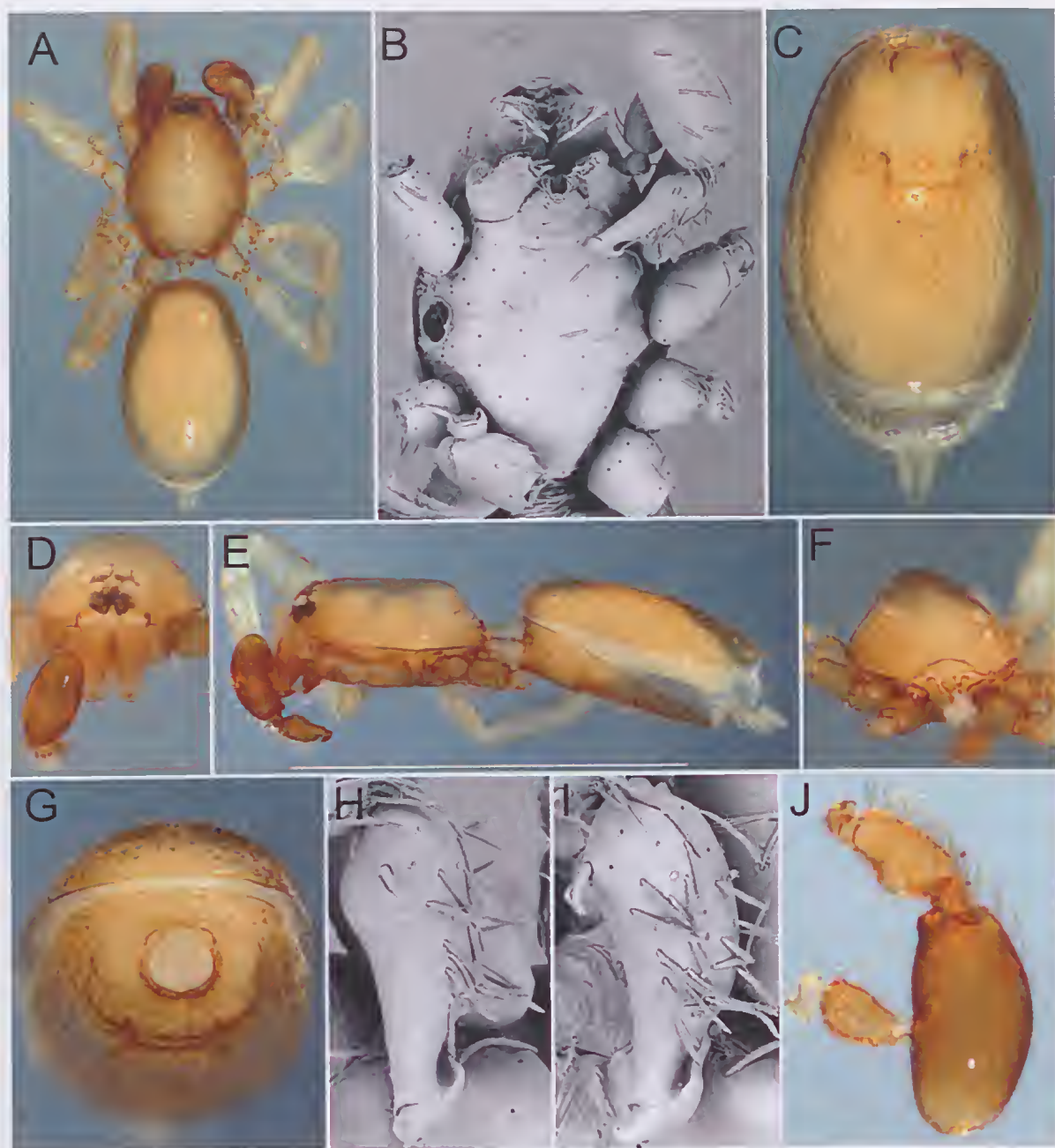


FIG. 79. *Opopaea ameyi* Baehr, sp. nov., male (PBI_OON 06021 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

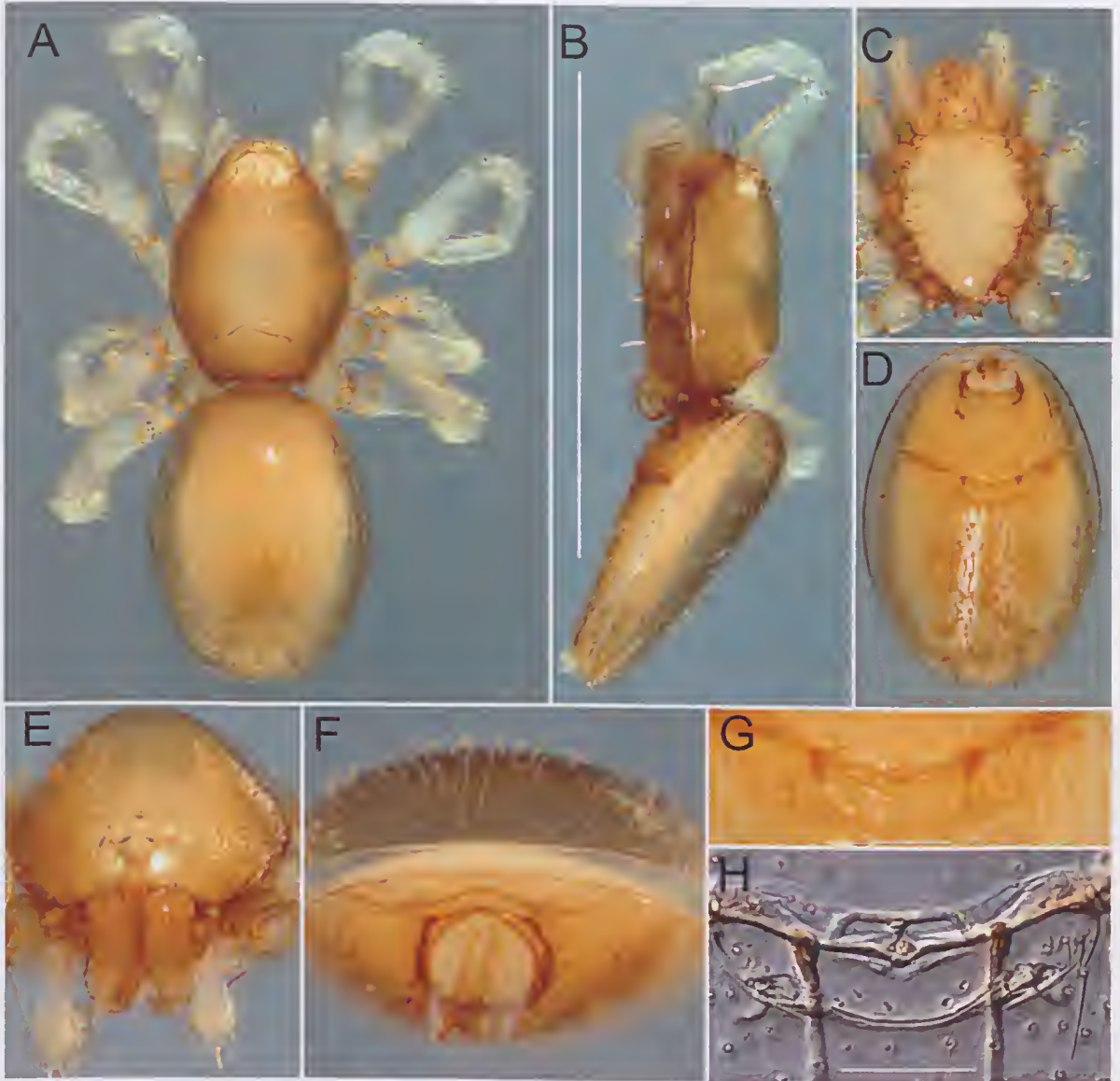


FIG. 80. *Opopaea ameyi* Baehr, sp. nov., female (PBI_OON 06021): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, opisthosoma, anterior view; F, prosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.

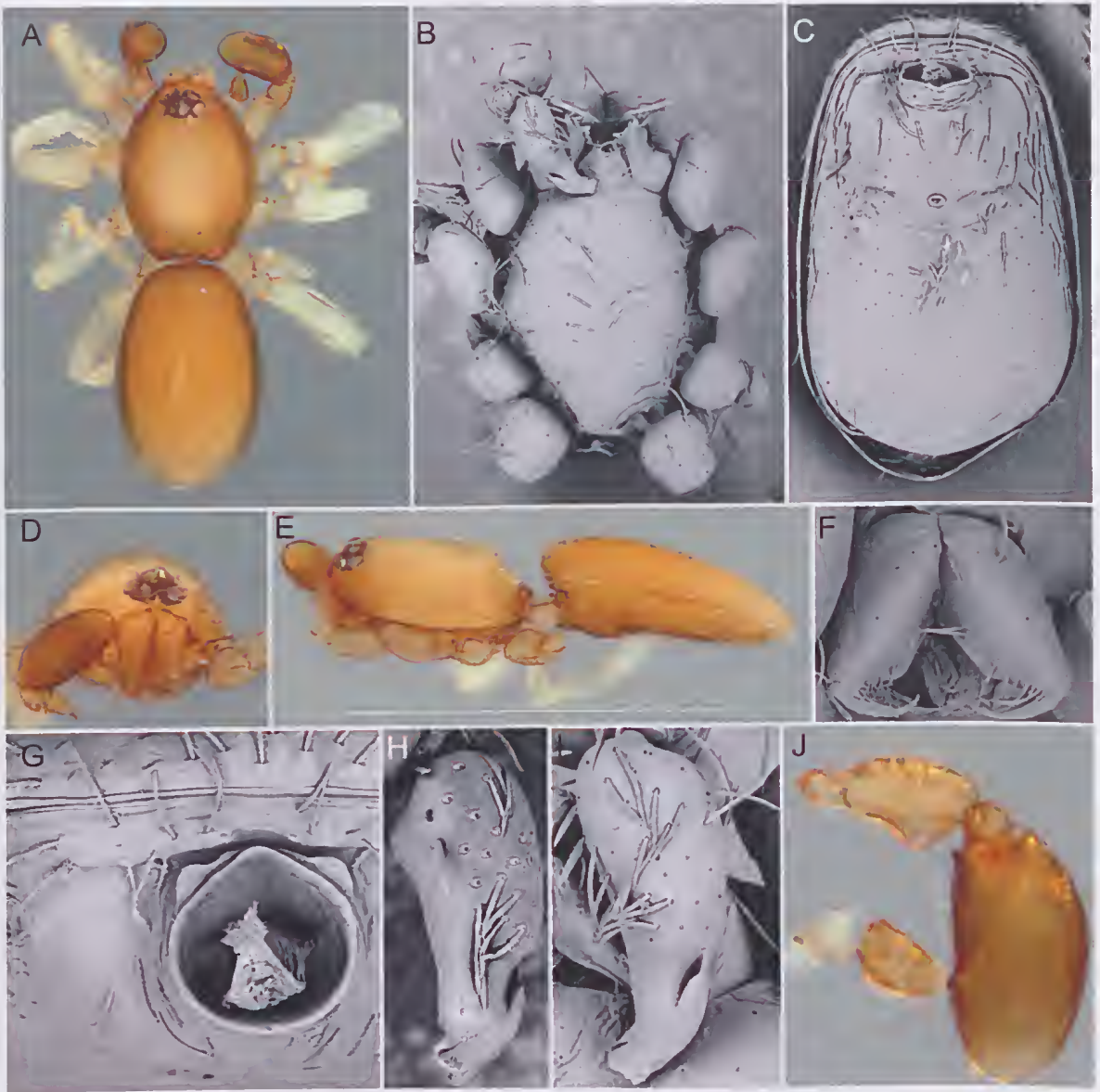


FIG. 81. *Opopaea brisbanensis* Baehr, sp. nov., male (PBI_OON 19235 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view. E habitus, lateral view; F, Chelicerae, anterior view; G, Pedicel, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

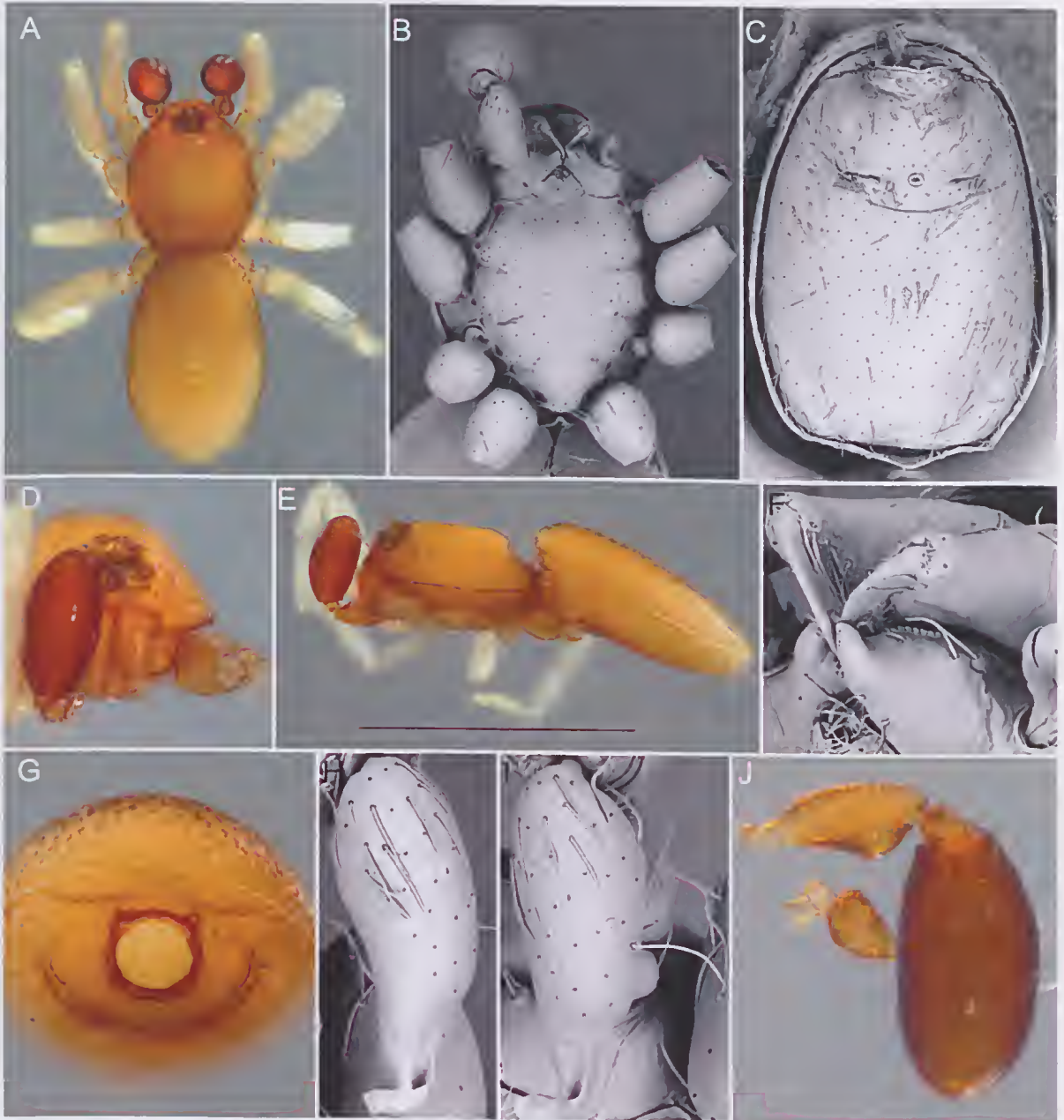


FIG. 82. *Opopaea broadwater* Baehr, sp. nov., male (PBI_OON 06624 photo, PBI_OON 23613 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventro-lateral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

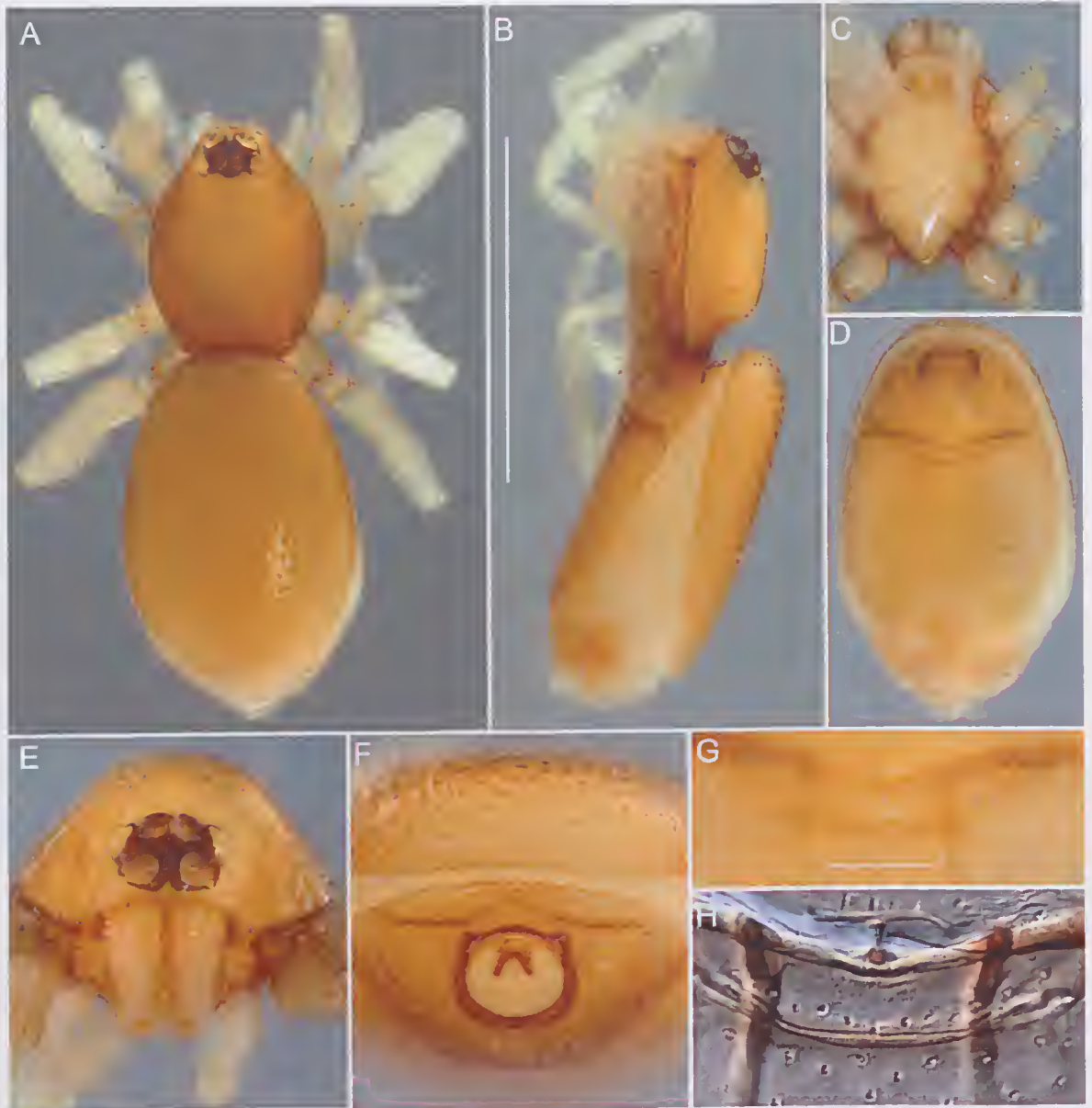


FIG. 83. *Opopaea broadwater* Baehr, sp. nov., female (PBI_OON 06624): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, opisthosoma, anterior view; F, prosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.



FIG. 84. *Opopaea carnarvon* Baehr, sp. nov., male (PBI_OON 23602 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, lateral view; D, prosoma, anterior view; E, habitus, lateral view; F, male palp, prolateral view; G, same, dorsal view (photo); H, same, dorsal view (SEM); I, same, retrolateral view.



FIG. 85. *Opopaea carteri* Baehr, sp. nov., male (PBI_OON 23407 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, Sperm pore, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

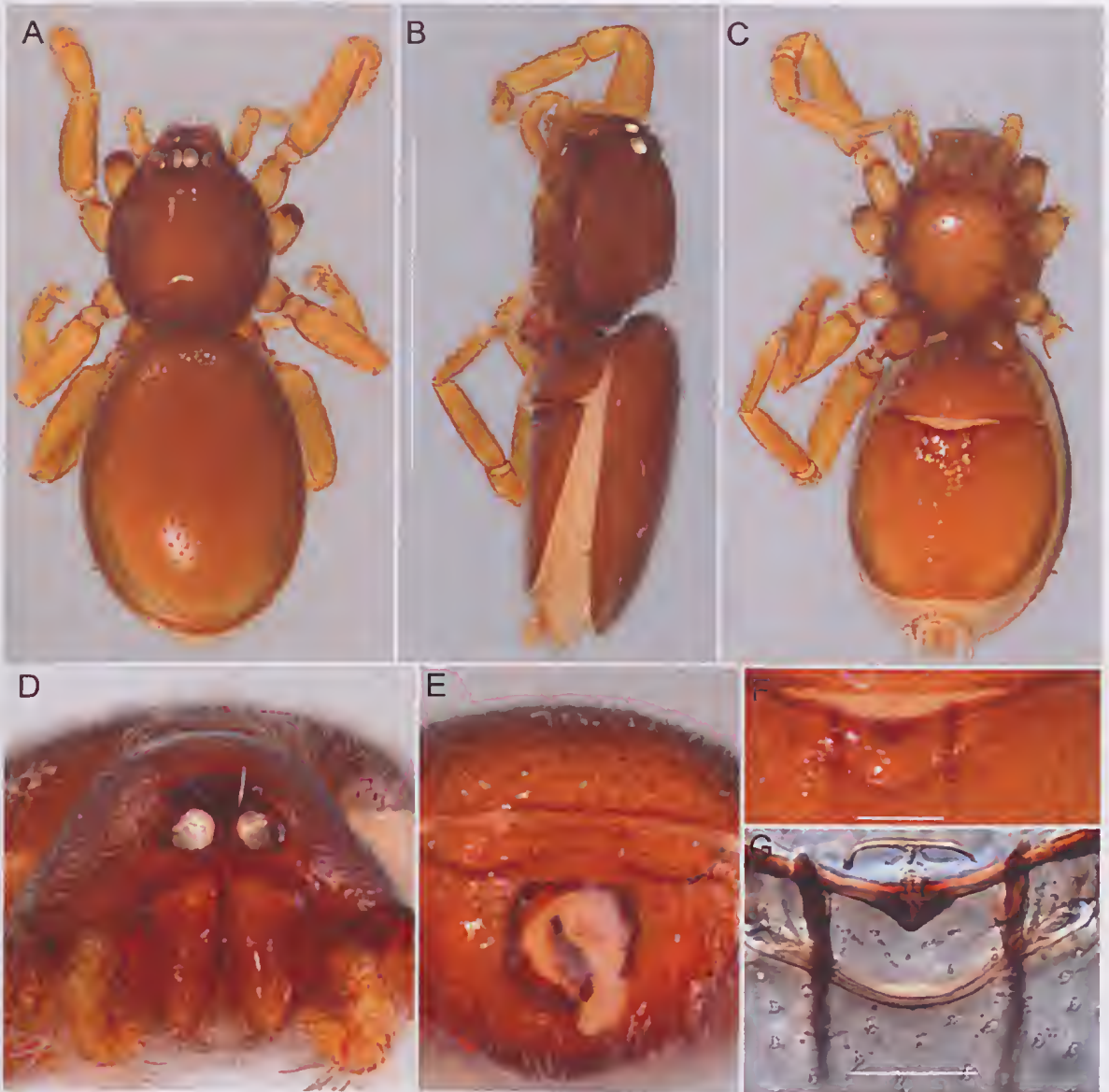


FIG. 86. *Opopaea carteri* Baehr, sp. nov., female (PBI_OON 23479): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne ventral view; G, female epigyne dorsal view.

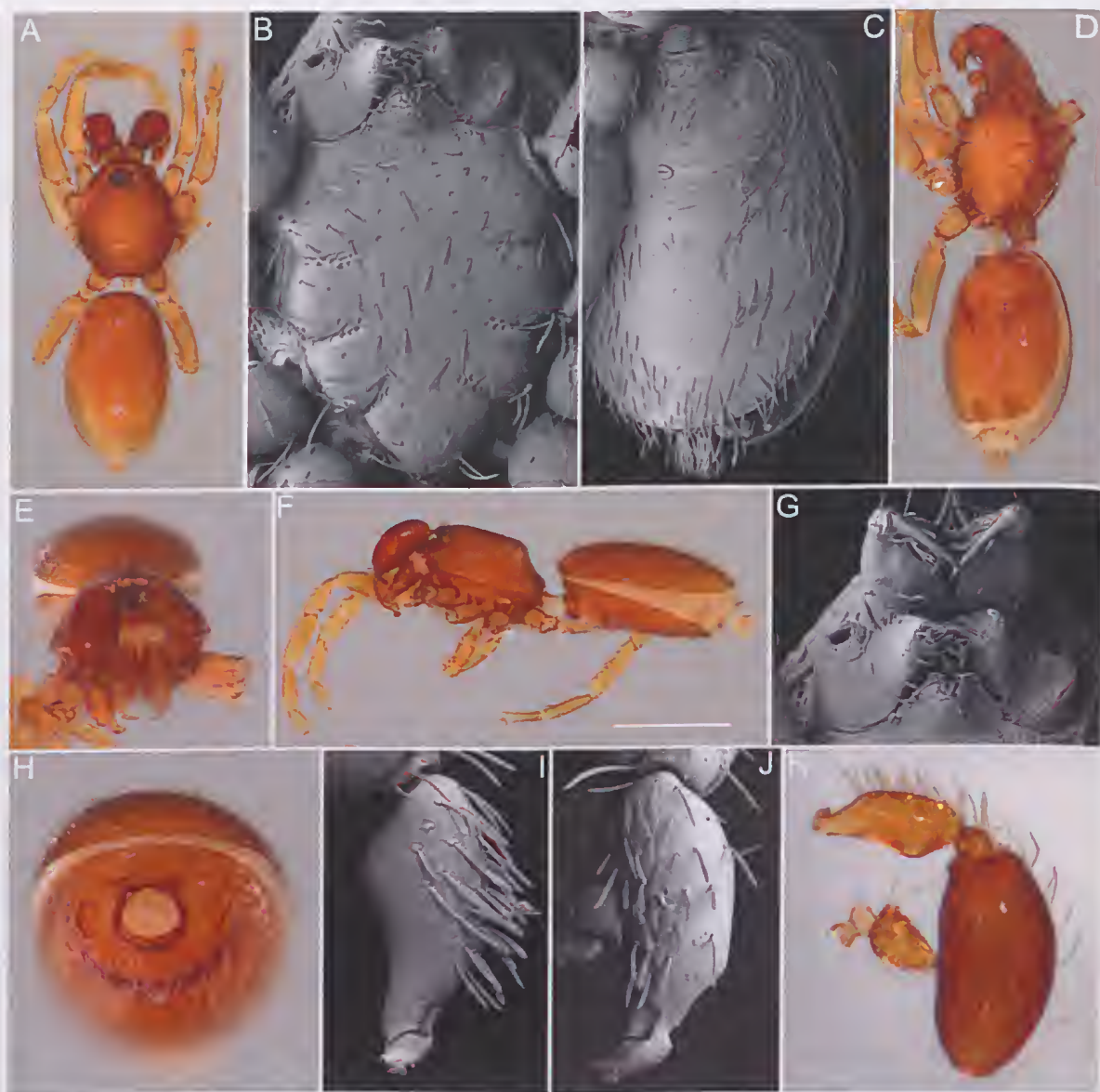


FIG. 87. *Opopaea chrisconwayi* Baehr and Smith, sp. nov., male (PBL_OON 23469 photo, PBL_OON 23470 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, habitus, ventral view; E, prosoma, anterior view; F, habitus, lateral view; G, mouthparts, ventral view; H, opisthosoma, anterior view; I, male palp, prolateral view; J, same, dorsal view; K, same, retrolateral view.

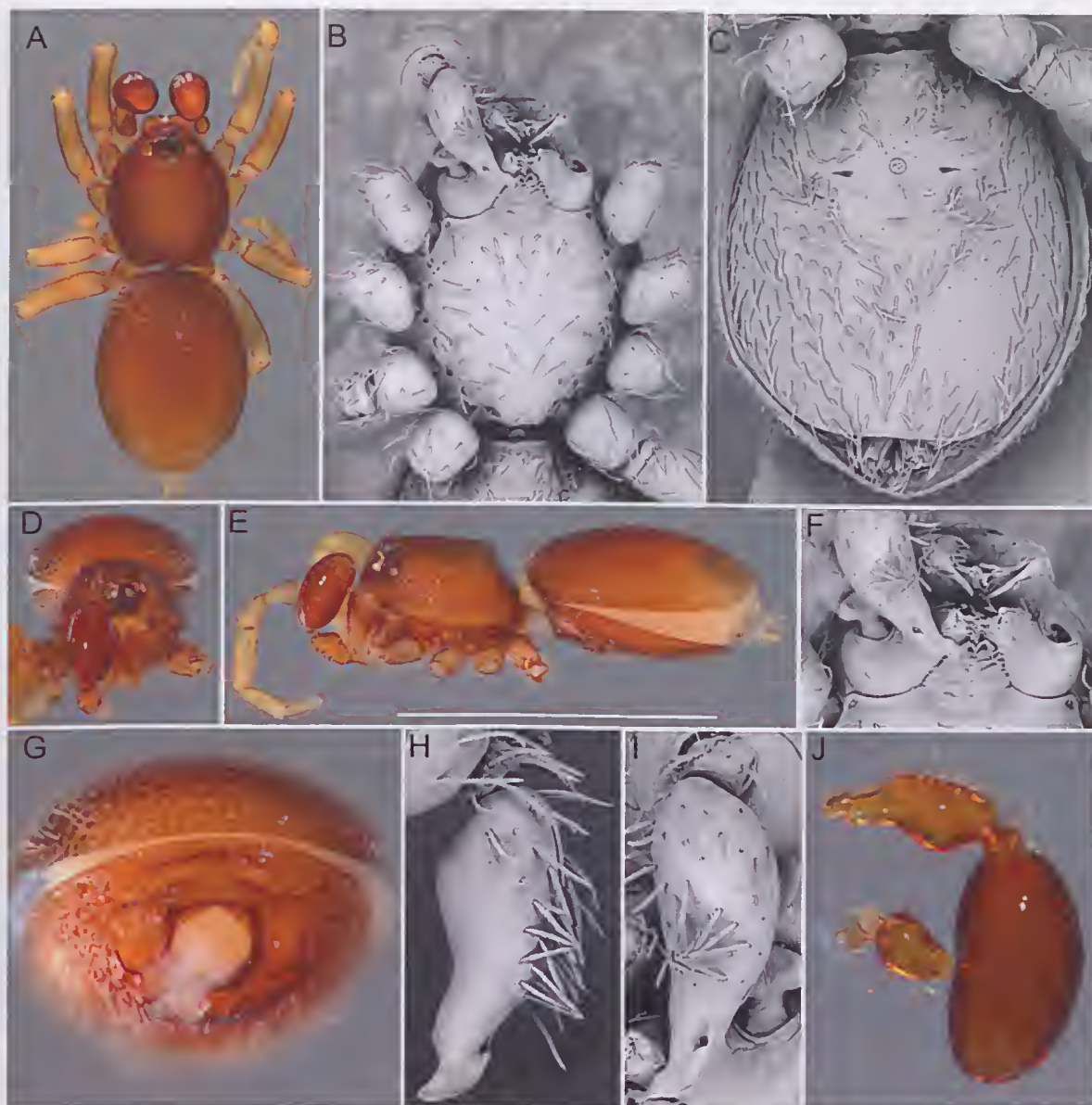


FIG. 88. *Opopaea douglasi* Bachr, sp. nov., male (PBI_OON 23422 photo, PBI_OON 23463 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

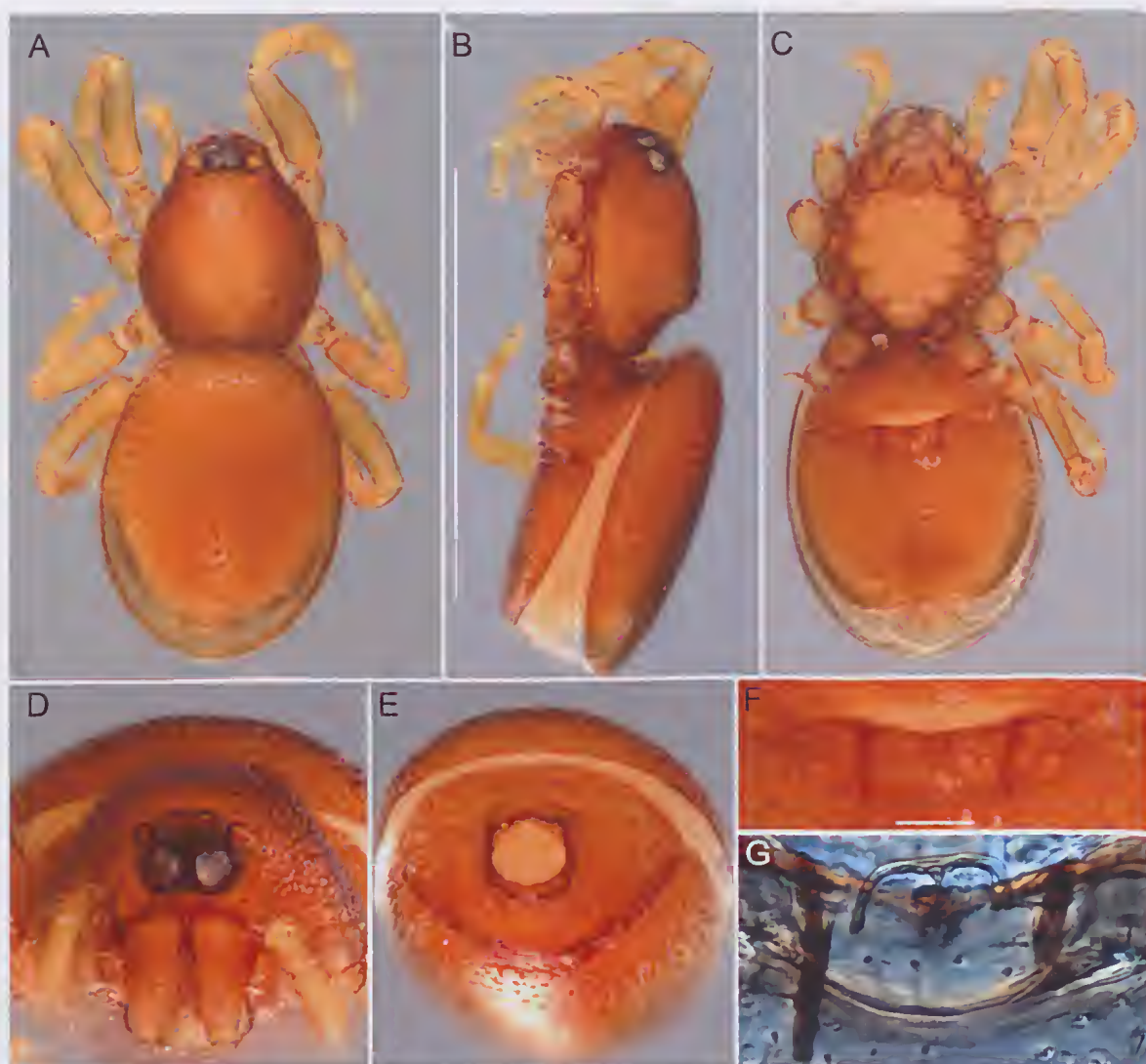


FIG. 89. *Opopaea douglasi* Baehr, sp. nov., female (PBI_OON 23423): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne ventral view; G, female epigyne dorsal view.



FIG. 90. *Opopaea lambkinae* Baehr, sp. nov., male (PBI_OON 23670 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 91. *Opopaea lambkinae* Baehr, sp. nov., female (PBI_OON 23671): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, opisthosoma, ventral view; E, prosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.

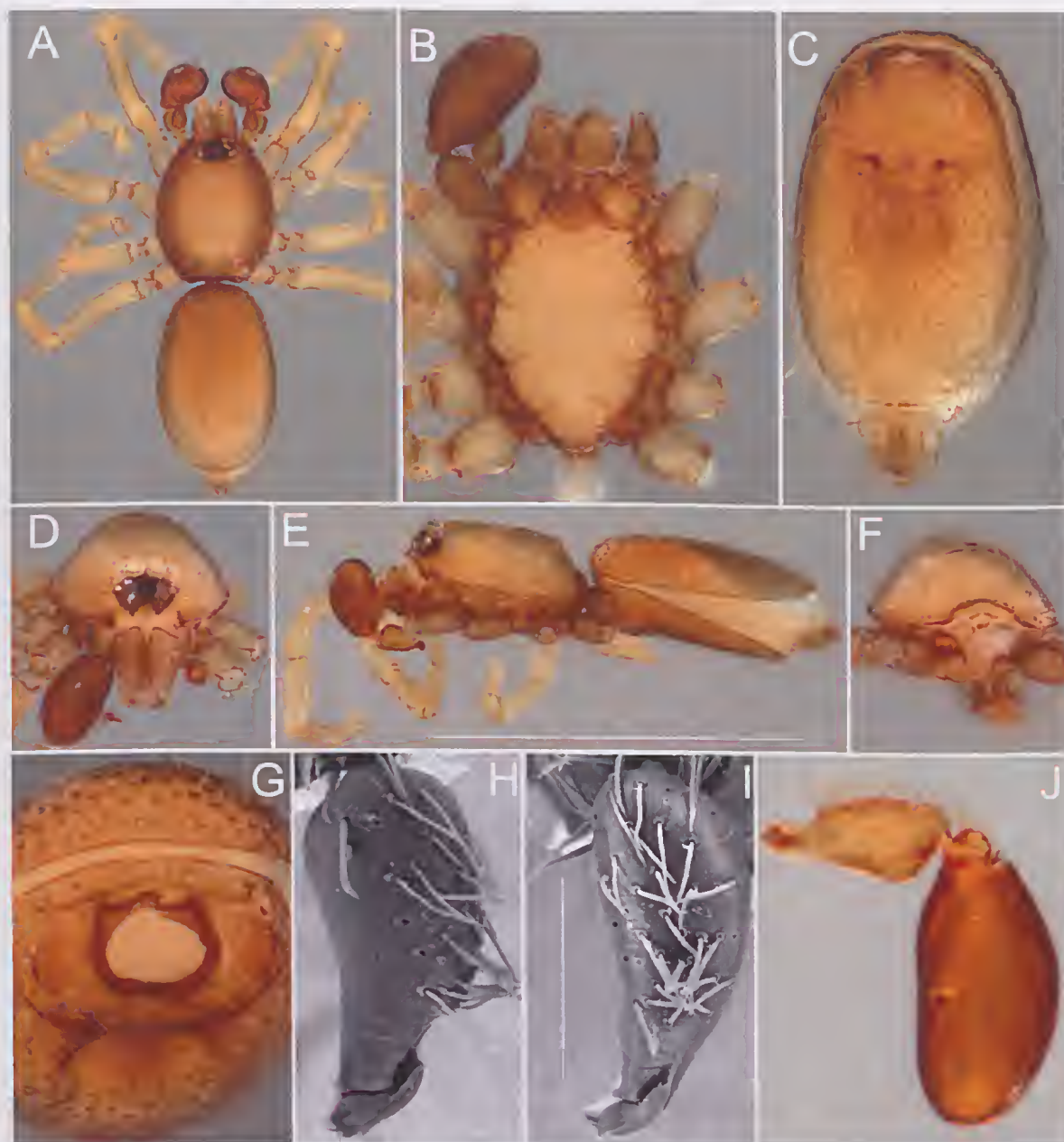


FIG. 92. *Opopaea leichhardti* Baehr, sp. nov., male (PBI_OON 23700 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 93. *Opopaea leichhardtii* Baehr, sp. nov., female (PBL_OON 237001): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, opisthosoma, ventral view; E, prosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.



FIG. 94. *Opopaea mcleani* Baehr, sp. nov., male (PBI_OON 06828 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

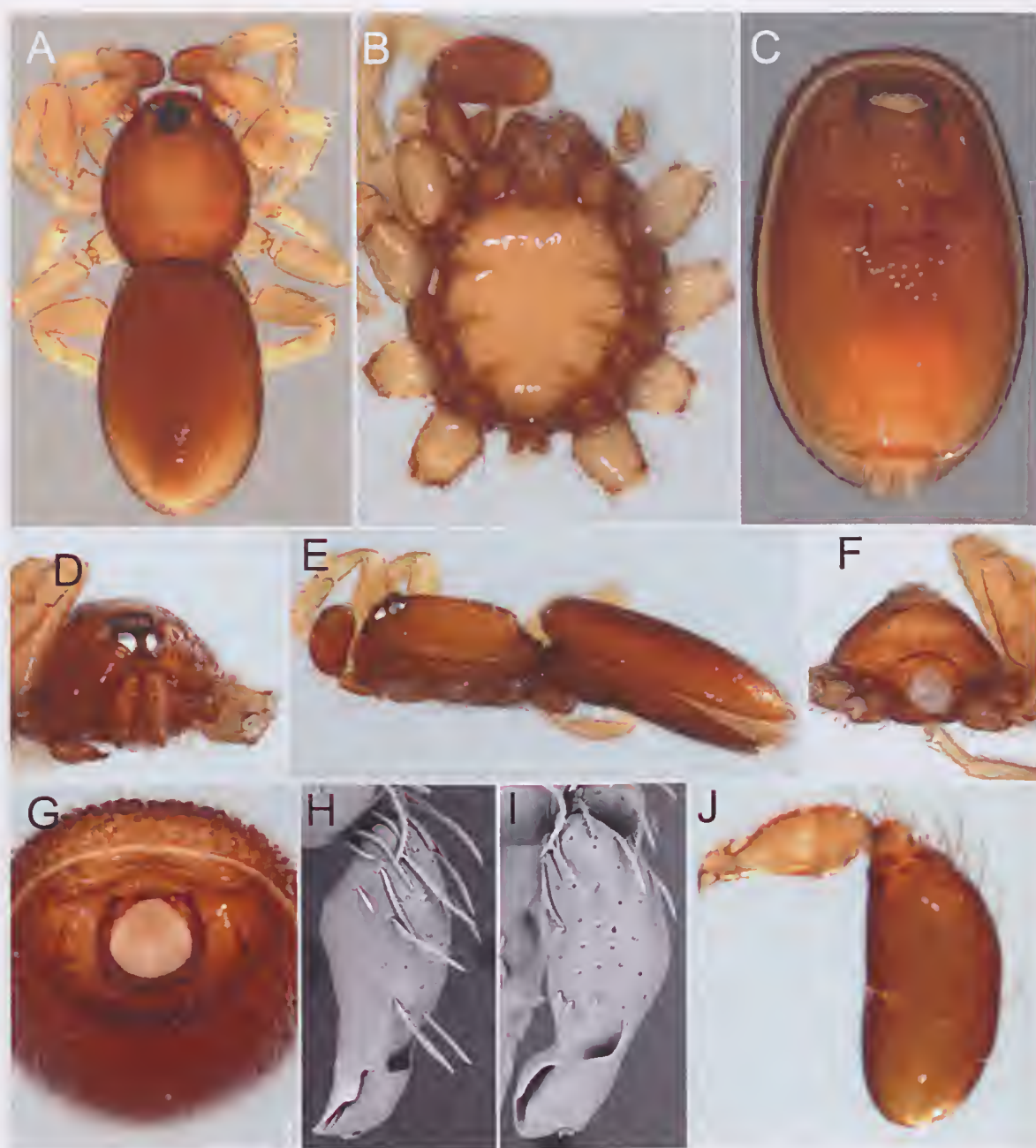


FIG. 95. *Opopaea proserpine* Baehr, sp. nov., male (PBI_OON 23664 photo, PBI_OON 23415 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

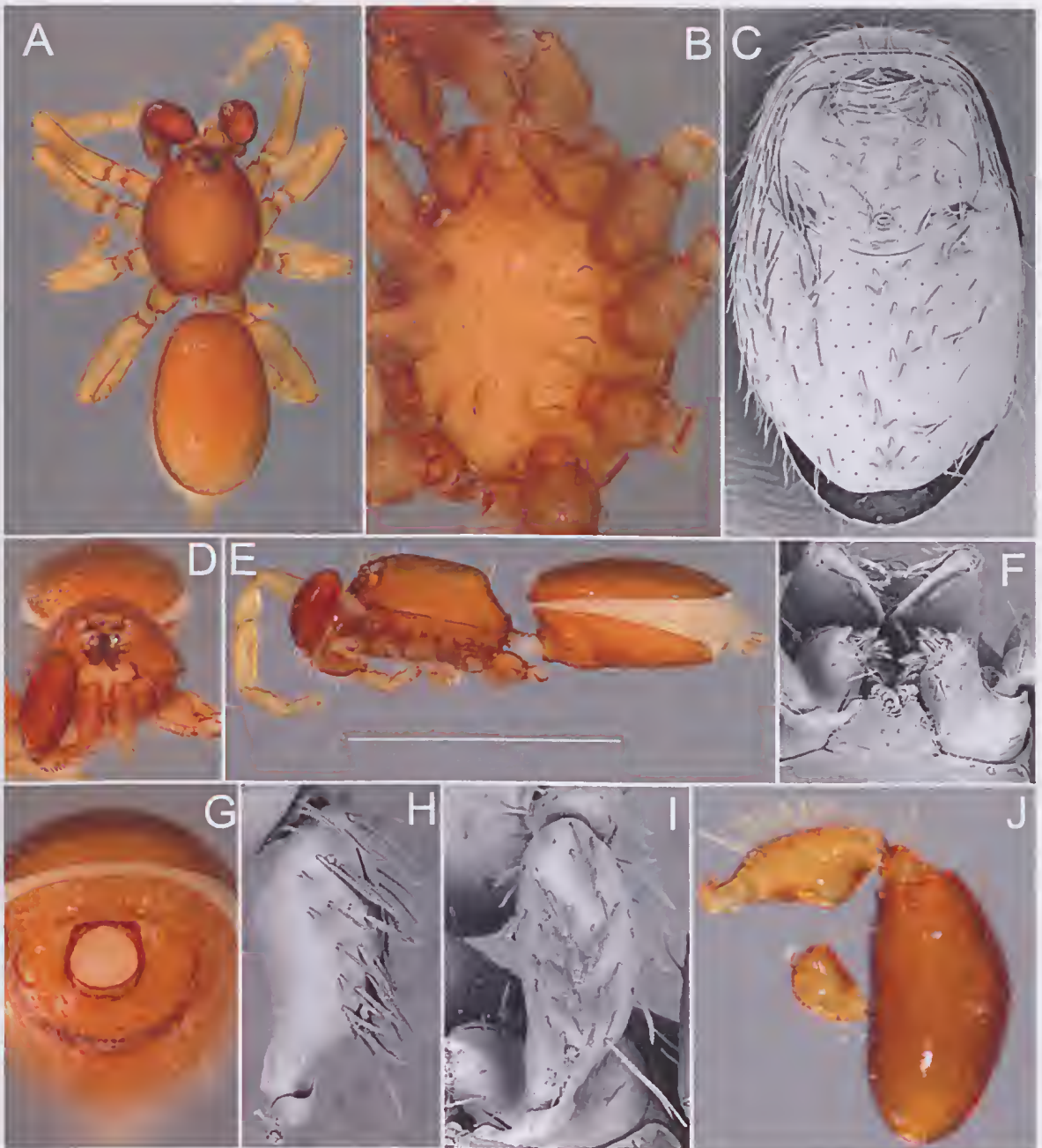


FIG. 96. *Opopaea stanisici* Baehr, sp. nov., male (PBI_OON 23405 photo, PBI_OON 23415 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

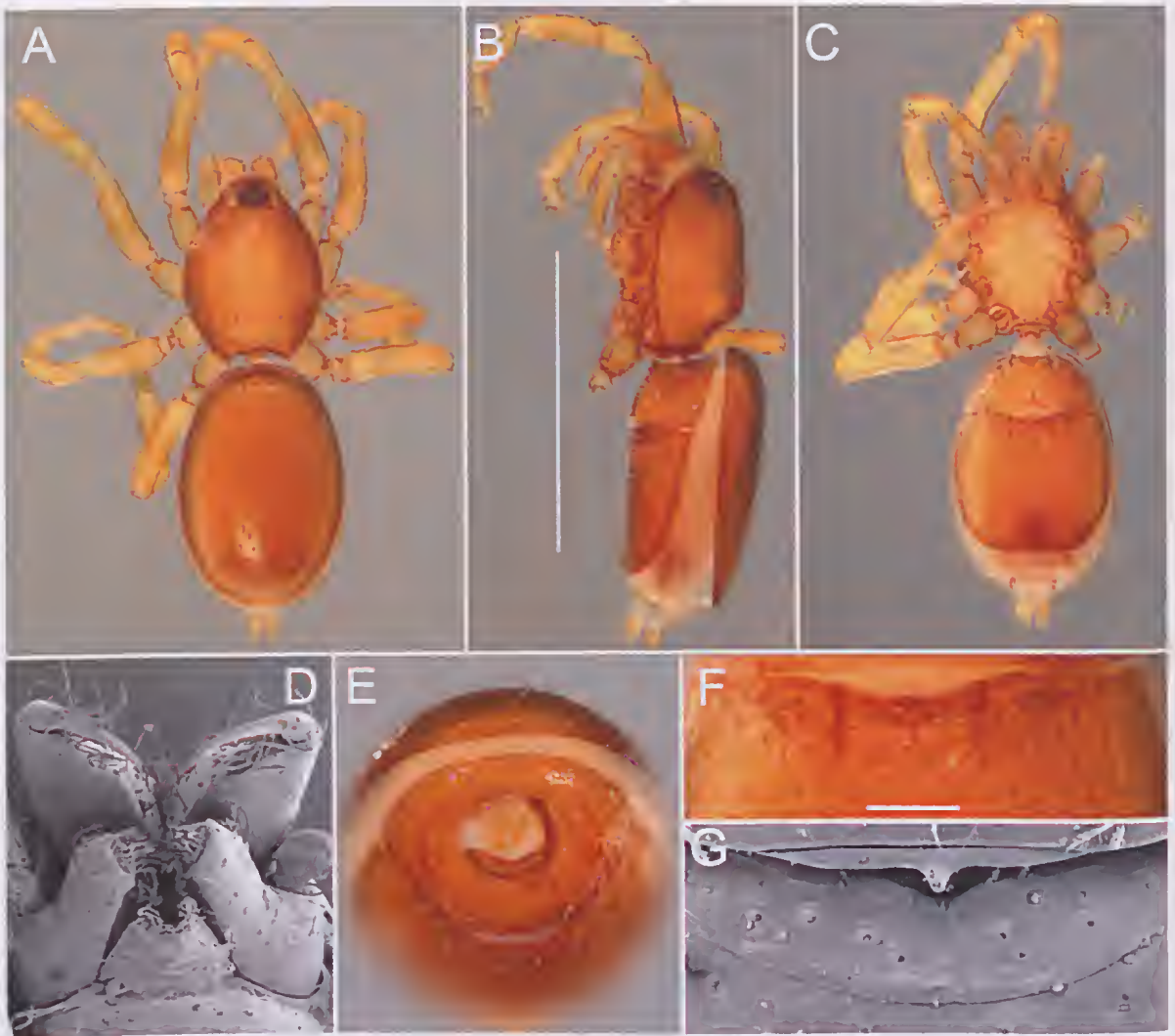


FIG. 97. *Opopaea stanisici* Baehr, sp. nov., female (PBI_OON 23411): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, mouthparts, ventral view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

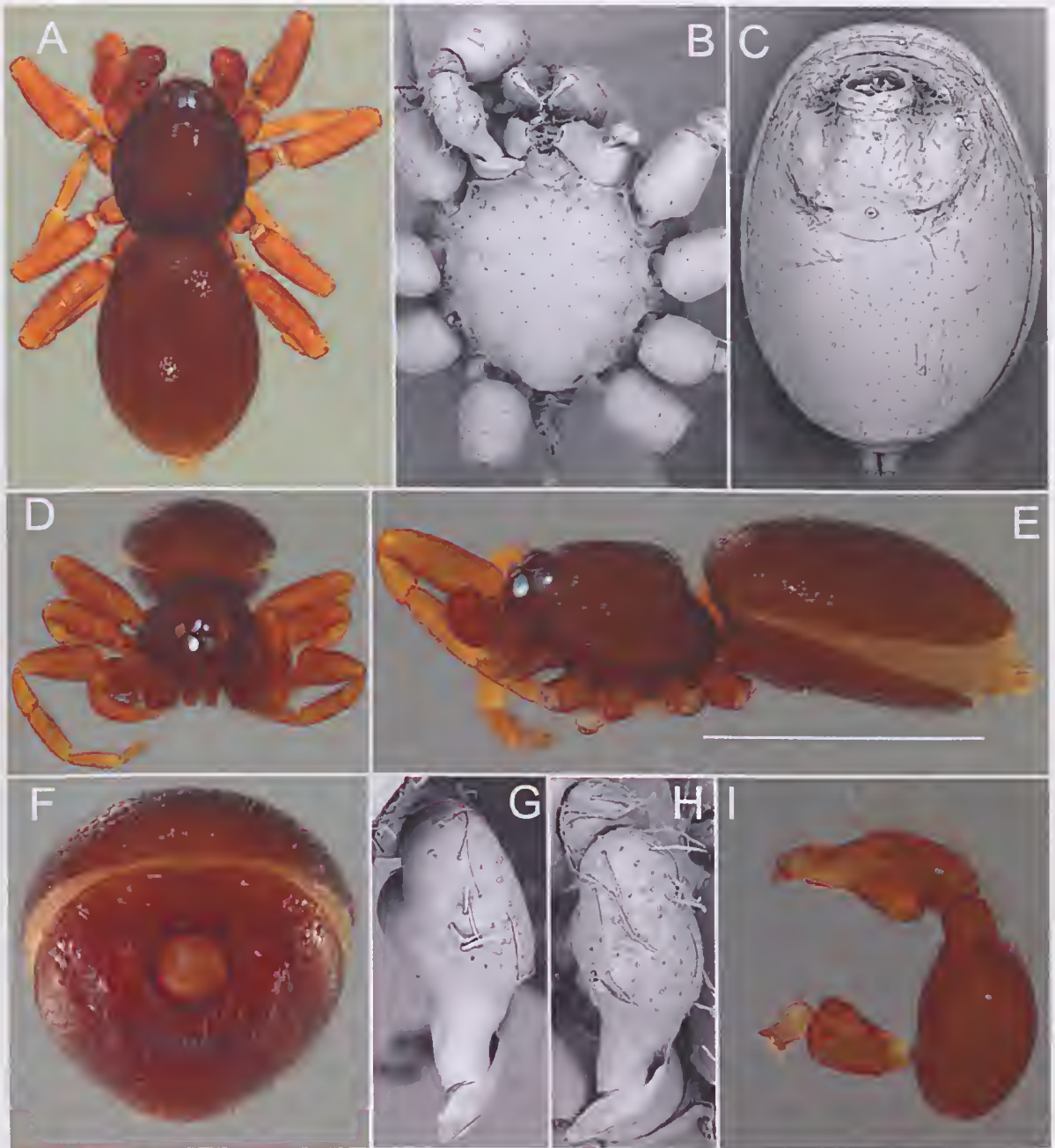


FIG. 98. *Opopaea ulrichi* Baehr, sp. nov., male (PBI_OON 22896 photo, PBI_OON 23415 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, male palp, prolateral view; H, same, dorsal view; I, same, retrolateral view.

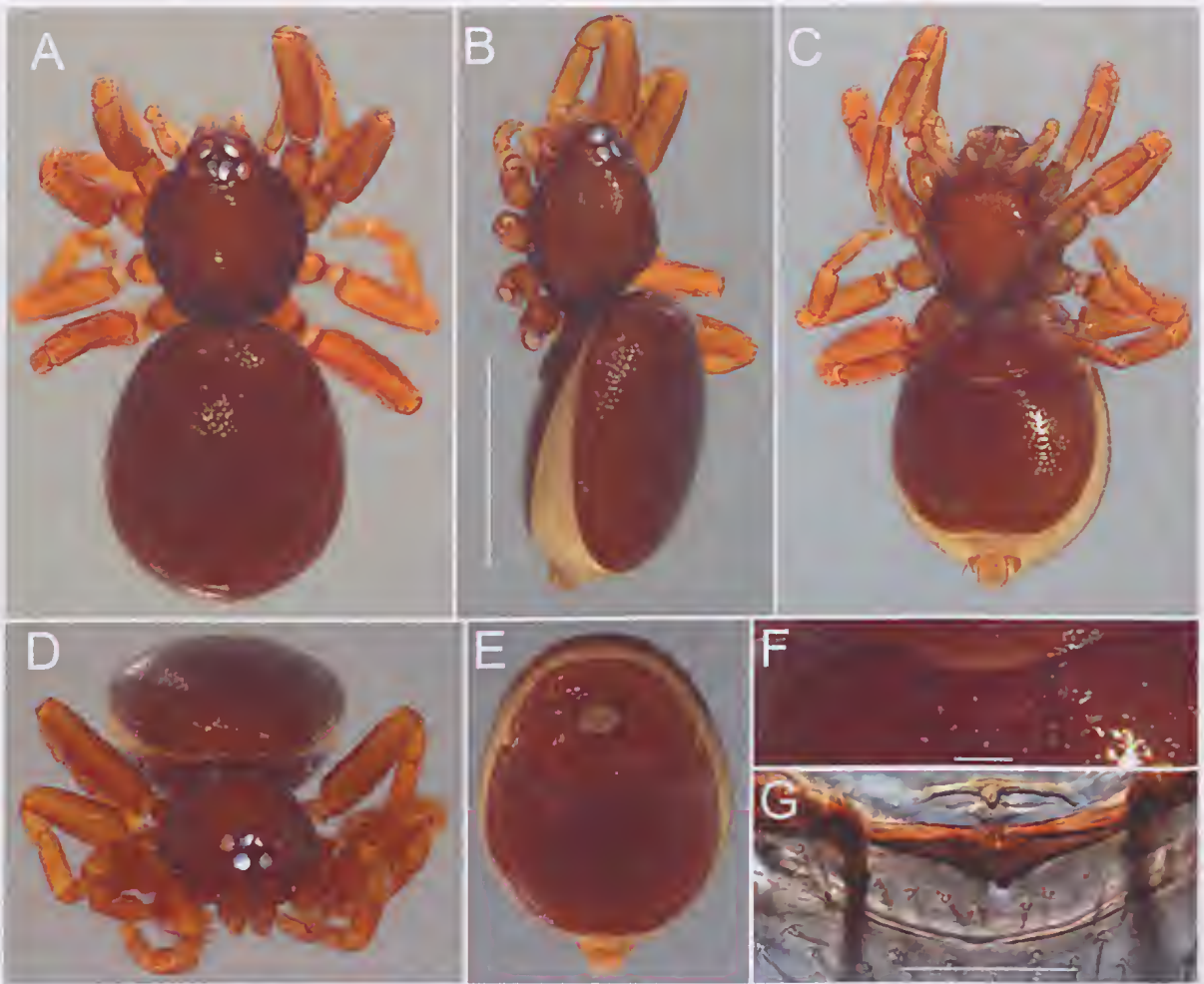


FIG. 99. *Opopaea ulrichi* Baehr, sp. nov., female (PBI_OON 22896): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, antero-ventral view; F, female epigyne, ventral view; G, same, dorsal view.

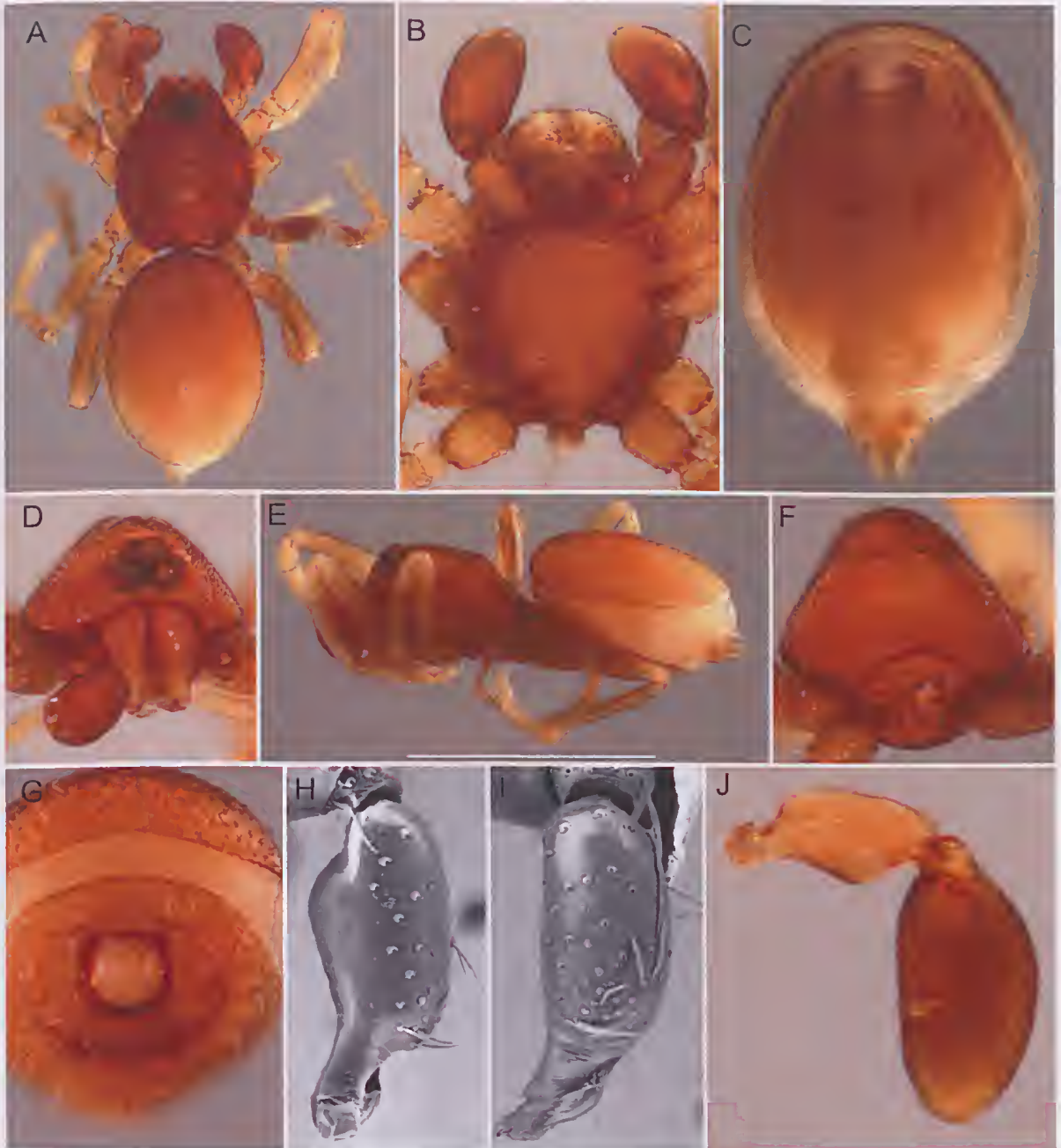


FIG. 100. *Opopaea banksi* (Hickman), male (PBI_OON 23677 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 101. *Opopaea banksi* (Hickman), female (PBI_OON 23678): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, opisthosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.

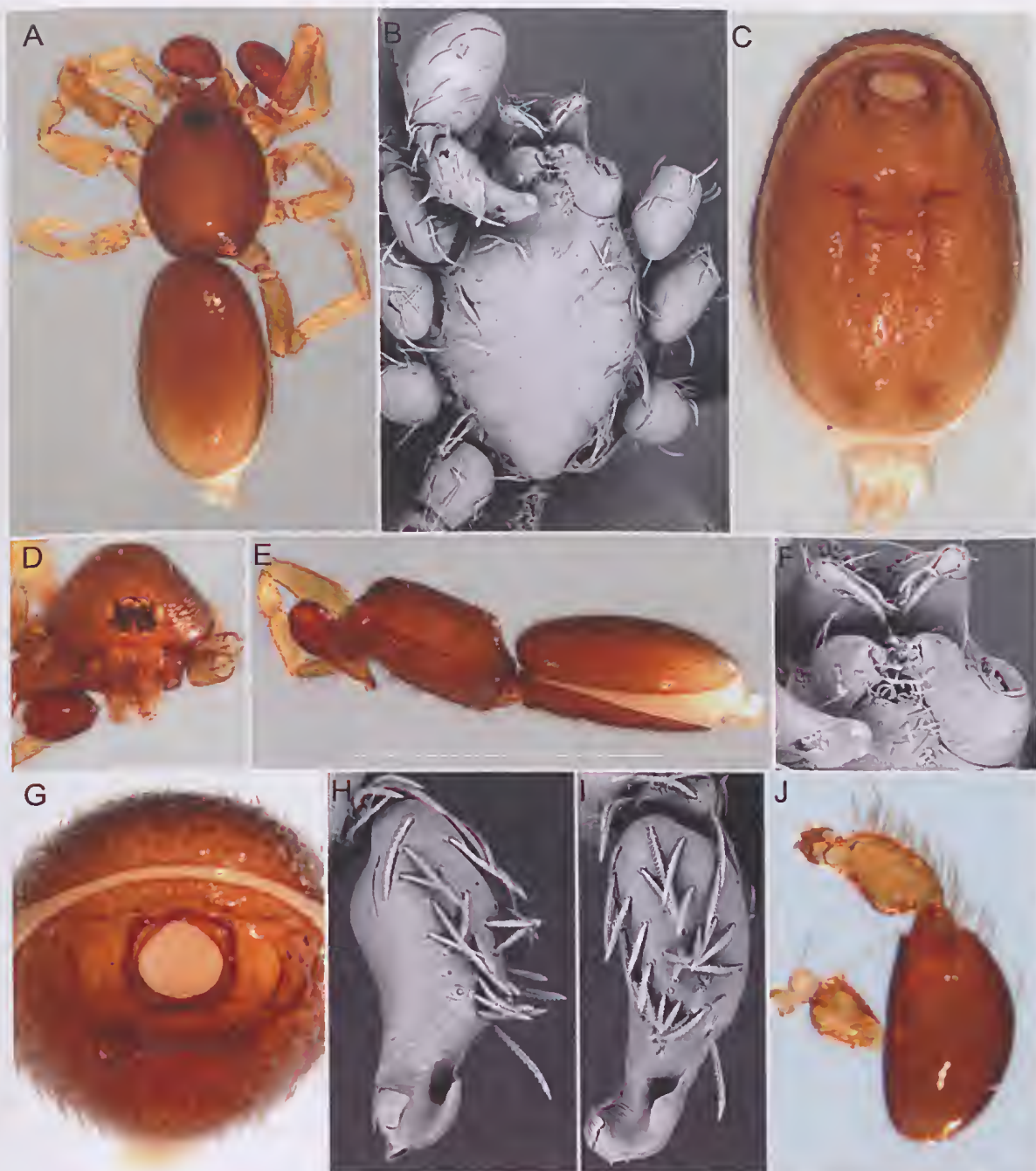


FIG. 102. *Opopaea millbrook* Baehr, sp. nov., male (PBI_OON 22884 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 103. *Opopaea millbrook* Baehr, sp. nov., female (PBI_OON 23667): **A**, habitus, dorsal view; **B**, same, lateral view; **C**, same, ventral view; **D**, prosoma, anterior view; **E**, opisthosoma, anterior view; **F**, female epigyne, ventral view; **G**, same, dorsal view.



FIG. 104. *Opopaea mundy* Baehr, sp. nov., male (PBI_OON 22883 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

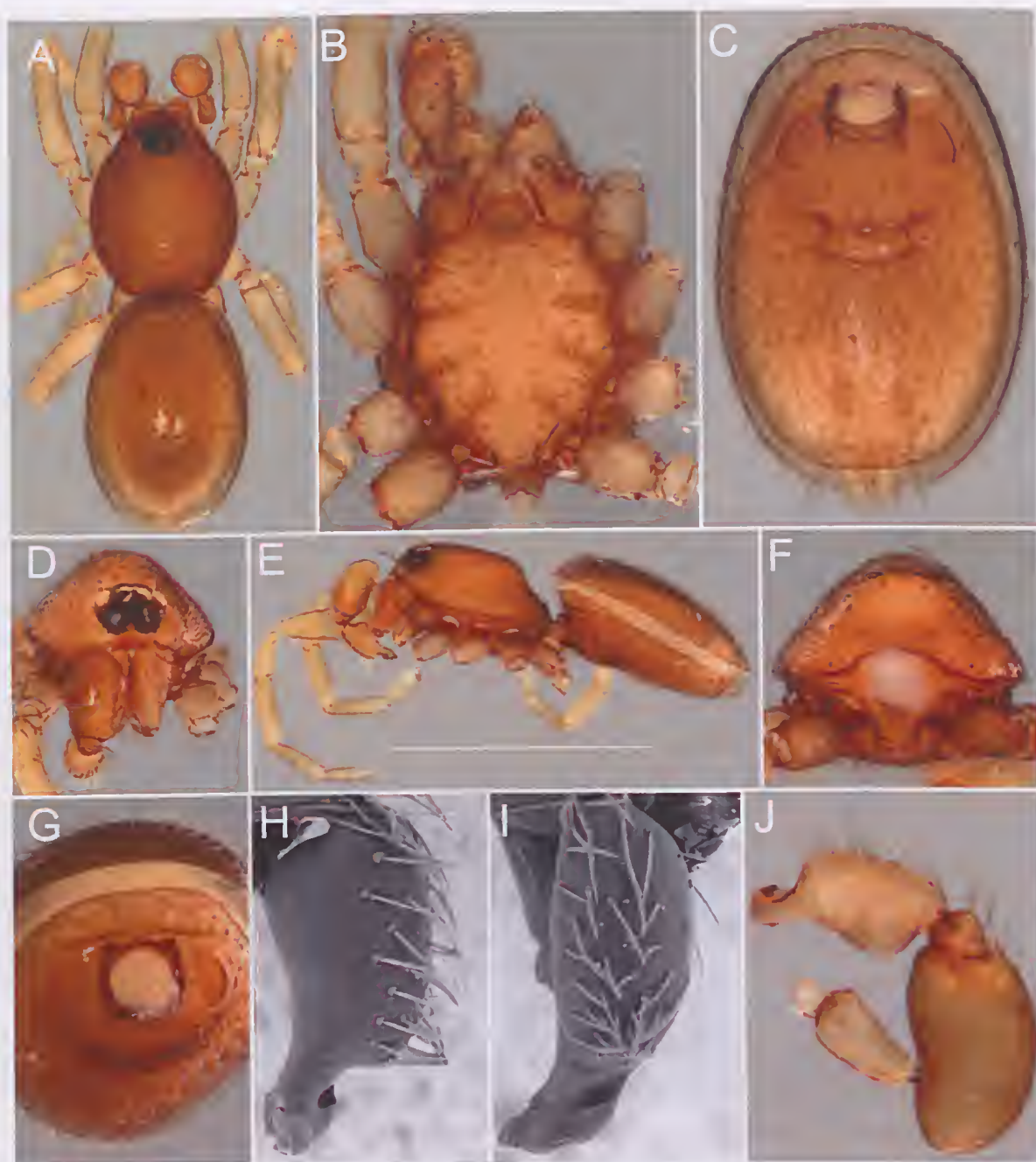


FIG. 105. *Opopaea stevensi* Baehr, sp. nov., male (PBI_OON 23699 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 106. *Opopaea aculeata* Baehr and Harvey, sp. nov., male (PBI_OON 04031 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

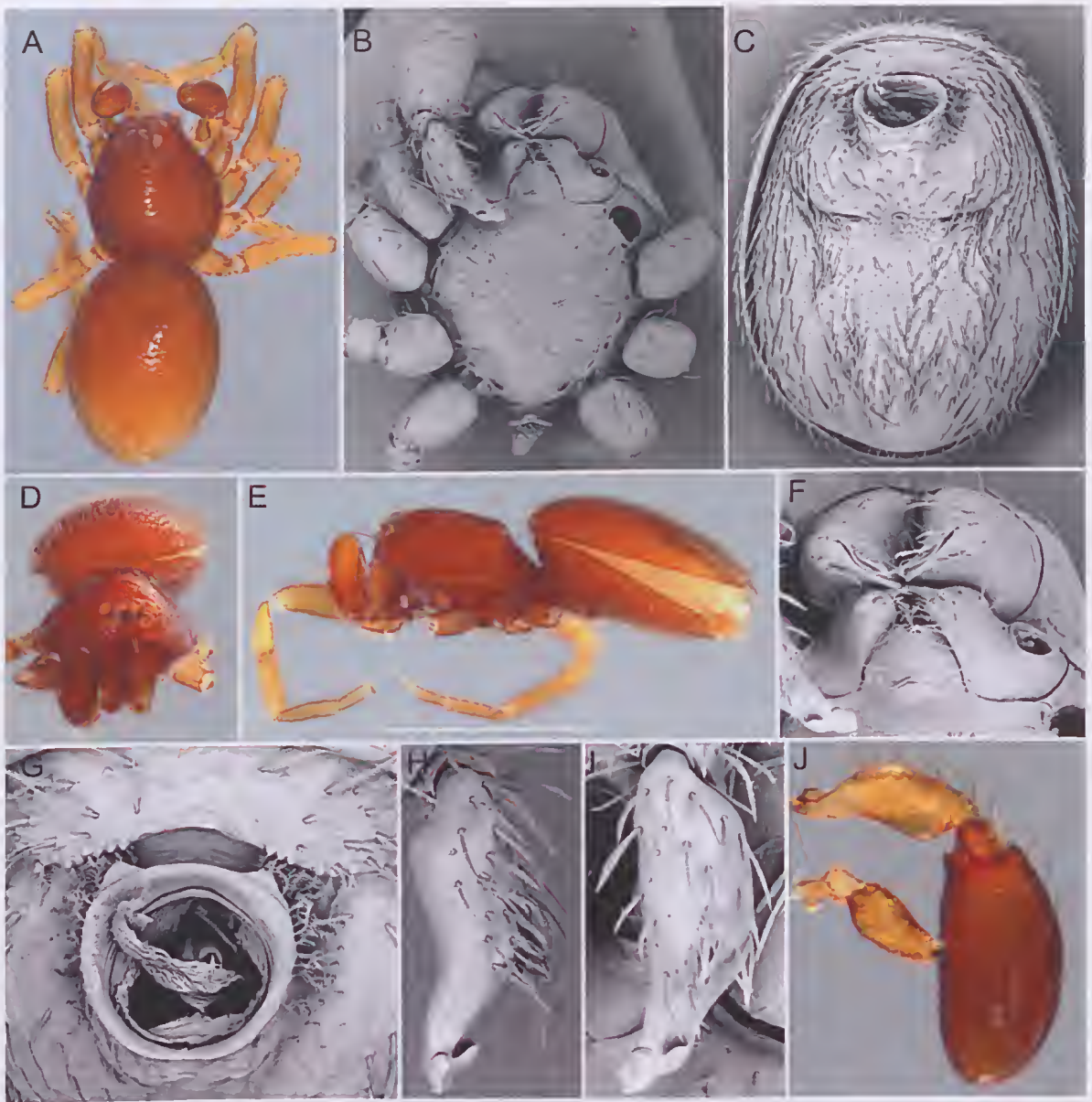


FIG. 107. *Opopaea aurantiaca* Baehr and Harvey, sp. nov., male (PBL_OON 04521 photo, PBL_OON 20369 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 108. *Opopaea aurantiaca* Baehr and Harvey, sp. nov., female (PBI_OON 19437): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 109. *Opopaea billrothi* Baehr and Harvey, sp. nov., male (PBI_OON 04378 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

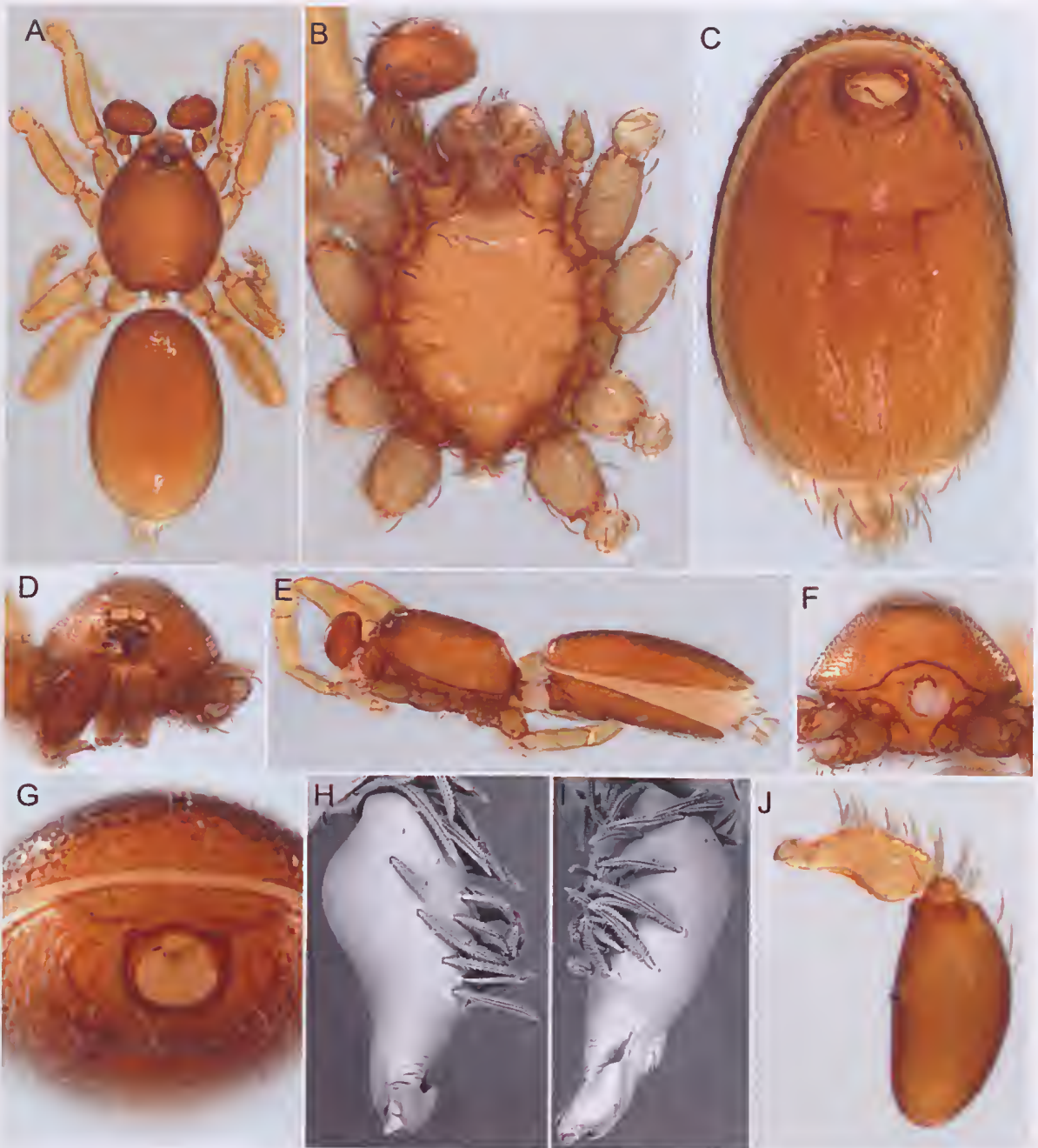


FIG. 110. *Opopaea callani* Baehr and Harvey, sp. nov., male (PBI_OON 23623 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 111. *Opopaea cowra* Baehr and Harvey, sp. nov., male (PBI_OON 04688 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, male palp, prolateral view; H, same, dorsal view; I, same, retrolateral view.



FIG. 112. *Opopaea durranti* Baehr and Harvey, sp. nov., male (PBI_OON 04649 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 113. *Opopaea exoculata* Baehr and Harvey, sp. nov., male (PBI_OON 04028 photo, PBI_OON 23615 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 114. *Opopaea flava* Baehr and Harvey, sp. nov., male (PBI_OON 04037 photo, PBI_OON 23617 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 115. *Opopaea fragilis* Baehr and Harvey, sp. nov., male (PBI_OON 22894 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

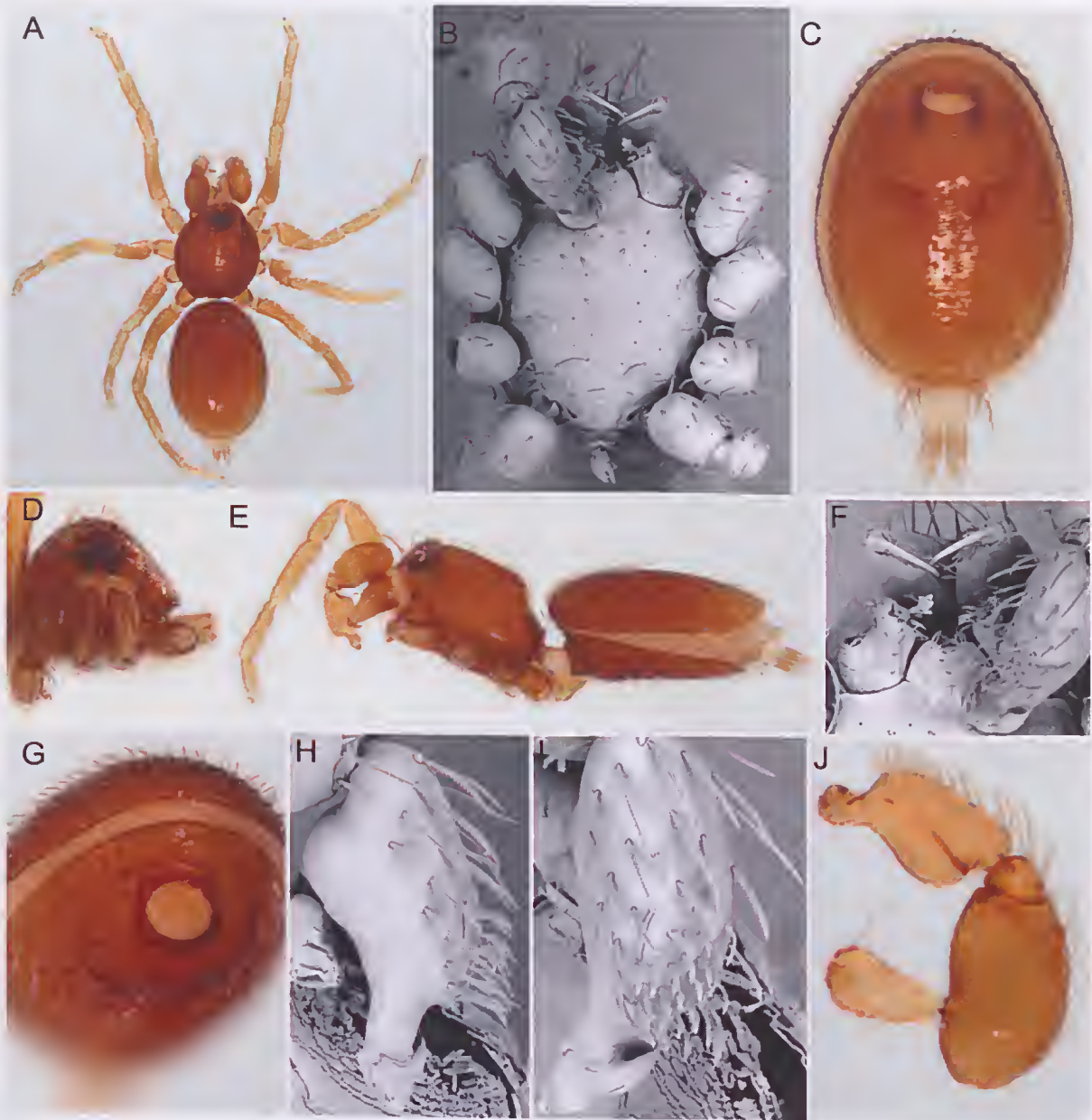


FIG. 116. *Opopaea framenauui* Baehr and Harvey, sp. nov., male (PBI_OON 23632 photo, PBI_OON 18029 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

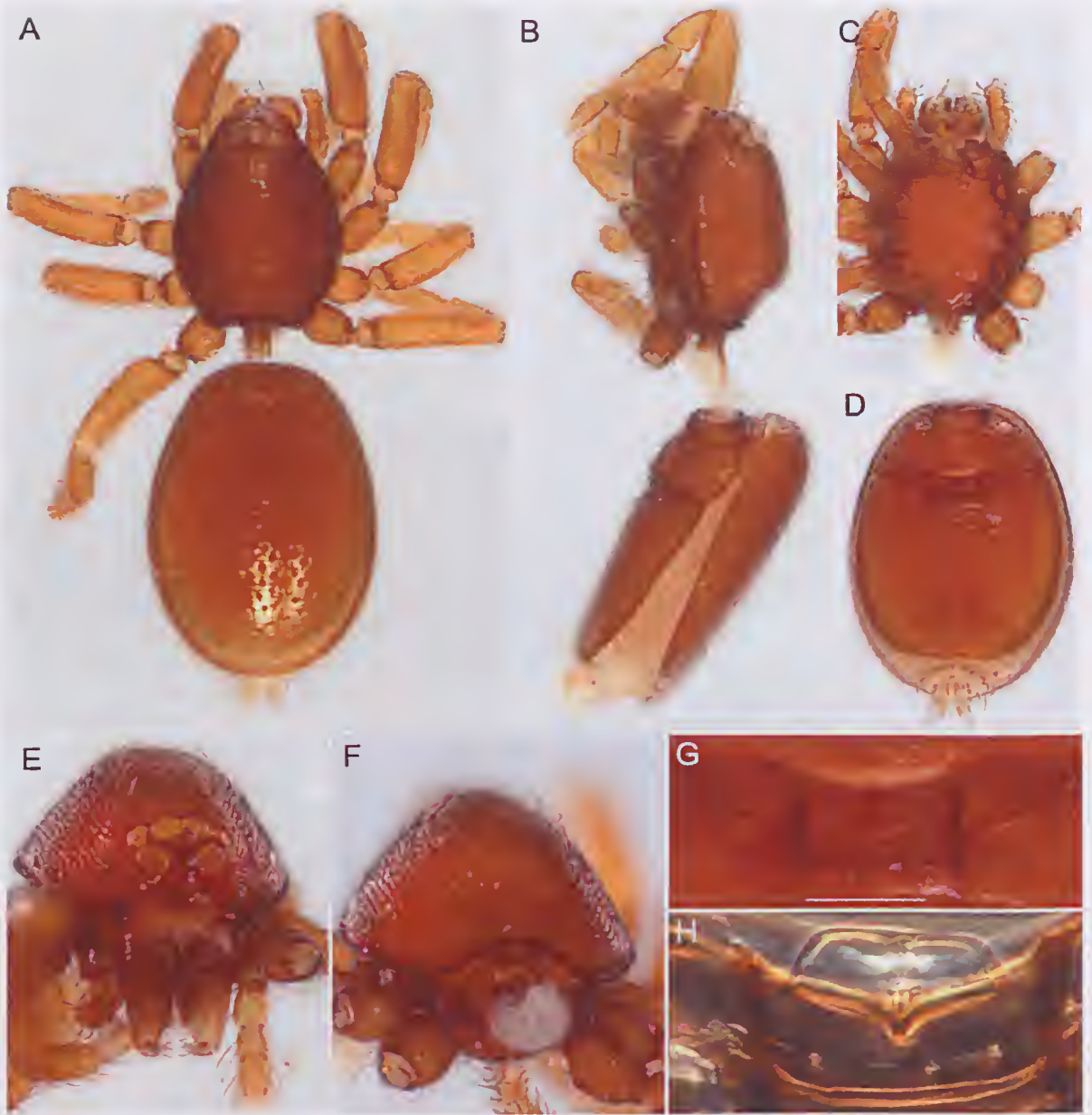


FIG. 117. *Opopaea framenau* Baehr and Harvey, sp. nov., female (PBI_OON 46762): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, prosoma, anterior view; F, prosoma, posterior view; G, female epigyne, ventral view; H, same, dorsal view.



FIG. 118. *Opopaea gracilis* Baehr and Harvey, sp. nov., male (PBI_OON 04029 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

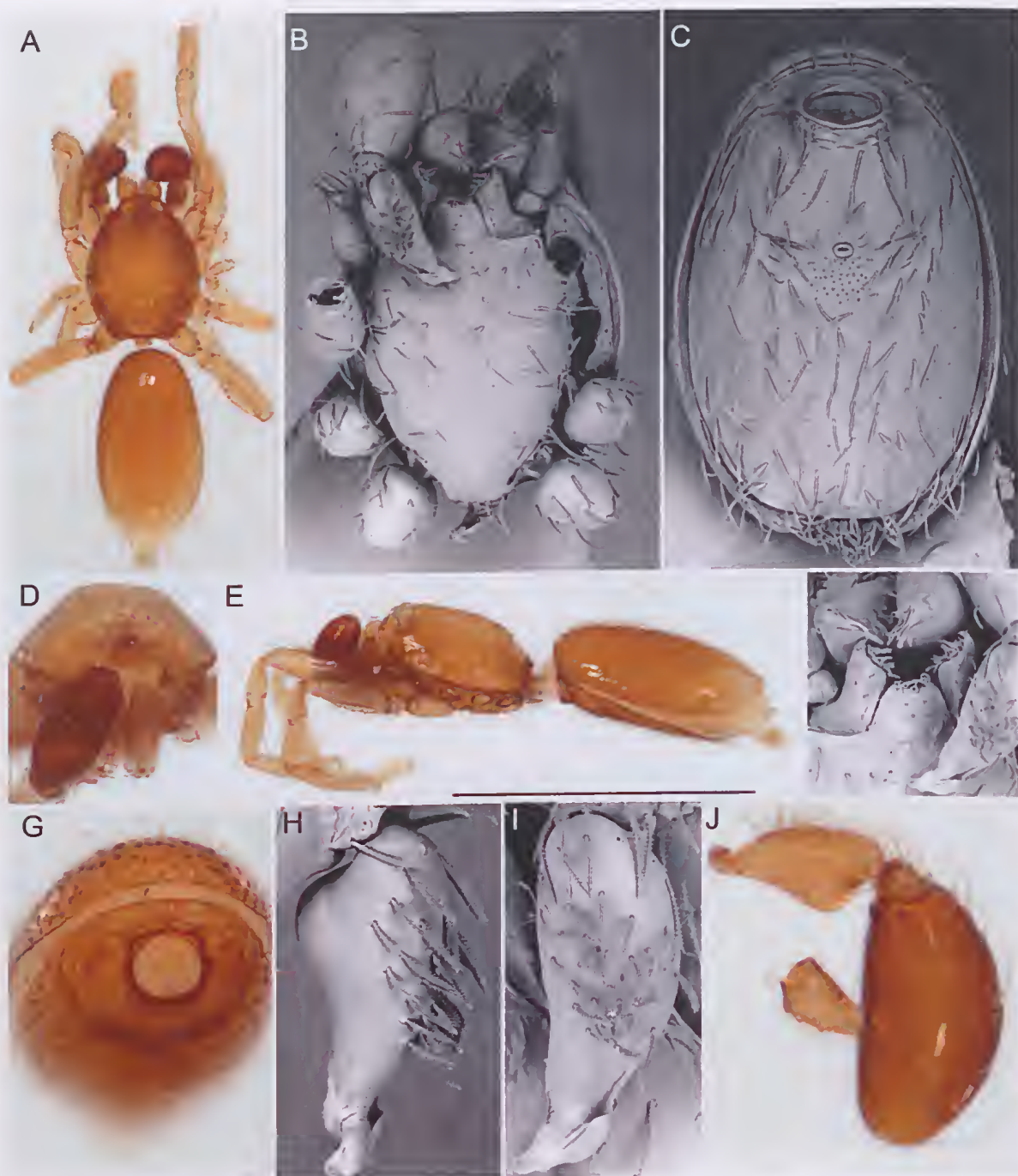


FIG. 119. *Opopaea gracillima* Baehr and Harvey, sp. nov., male (PBI_OON 23622 photo, PBI_OON 18026 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 120. *Opopaea gracillima* Baehr and Harvey, sp. nov., female (PBI_OON 23620): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 121 *Opopaea harmsi* Baehr and Harvey, sp. nov., male (PBI_OON 17804 photo, PBI_OON 23630 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 122. *Opopaea harmsi* Baehr and Harvey, sp. nov., female (PBI_OON 17782): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 123. *Opopaea johannae* Baehr and Harvey, sp. nov., male (PBI_OON 04625 photo, PBI_OON 48259 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

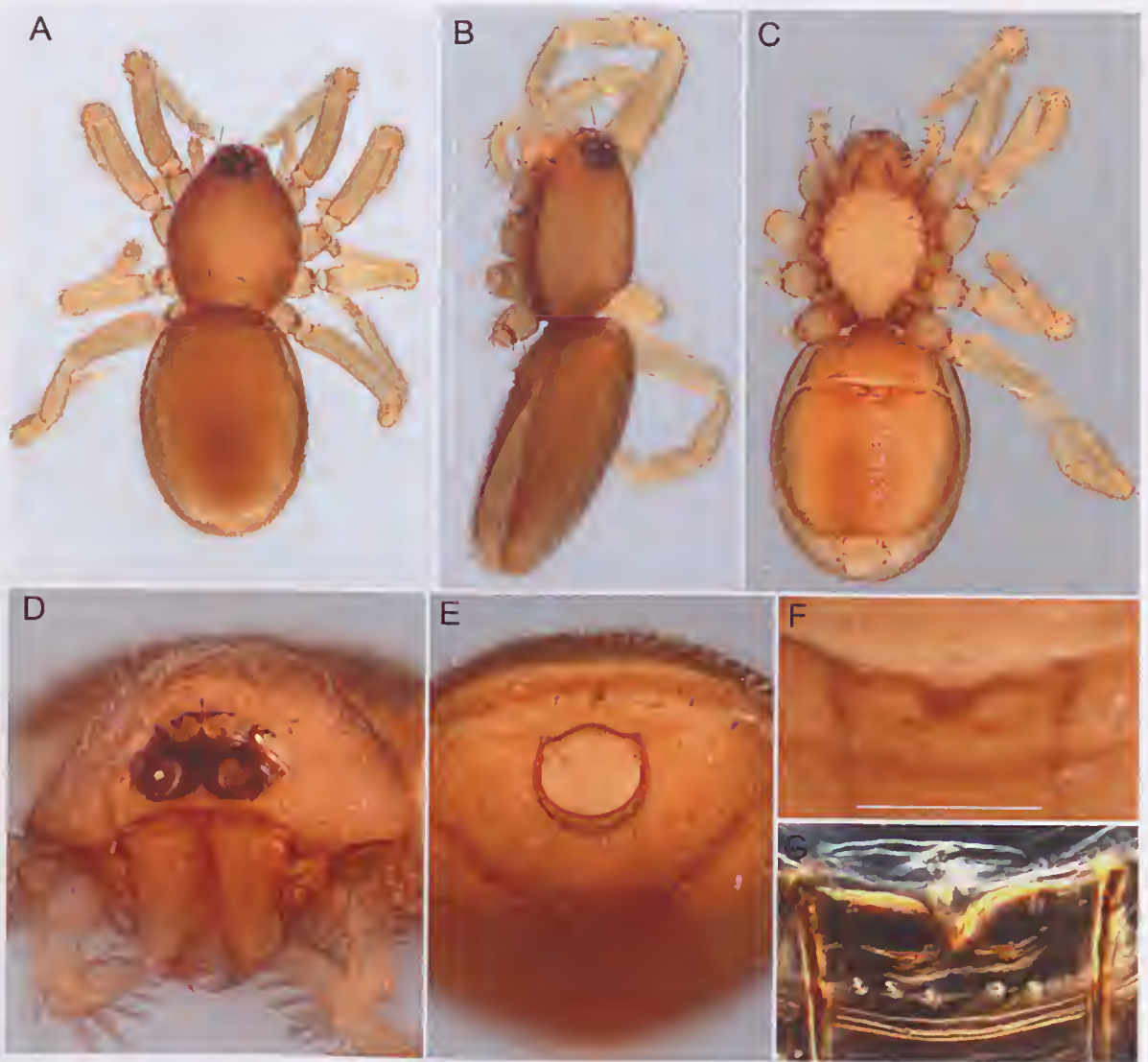


FIG. 124. *Opopaea johannae* Baehr and Harvey, sp. nov., female (PBI_OON 23623): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

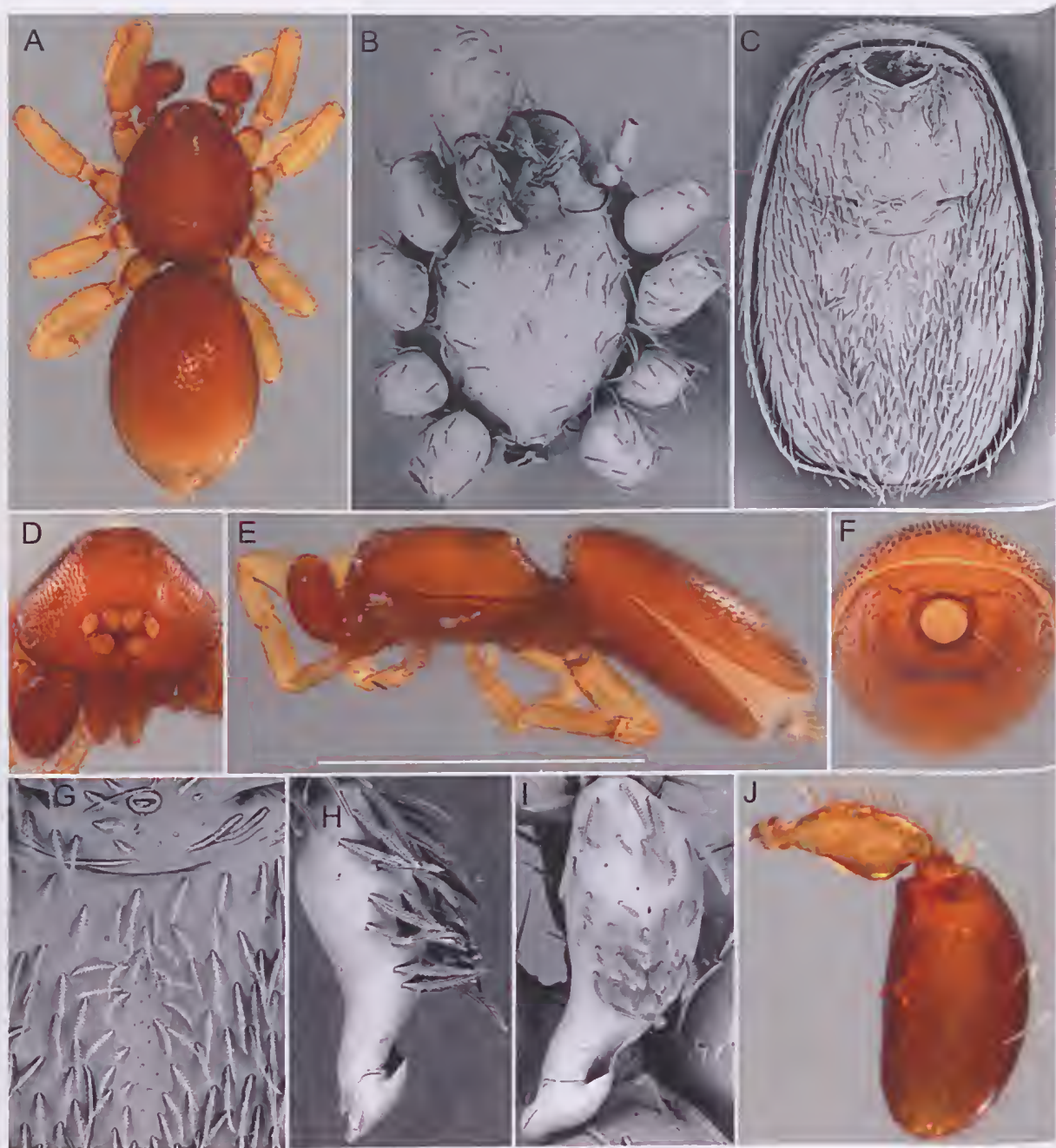


FIG. 125. *Opopaea julianneae* Baehr and Ott, sp. nov., male (PBI_OON 04675 photo, PBI_OON 48267 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, Postepigastric scutum, ventral view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 126. *Opopaea marangaroo* Baehr and Harvey, sp. nov., male (PBI_OON 18033 photo, PBI_OON 23636 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 127. *Opopaea marangaroo* Baehr and Harvey, sp. nov., female (PBI_OON 23637): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, prosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.



FIG. 128. *Opopaea millstream* Baehr and Harvey, sp. nov., male (PBI_OON 04630 photo, PBI_OON 20122 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

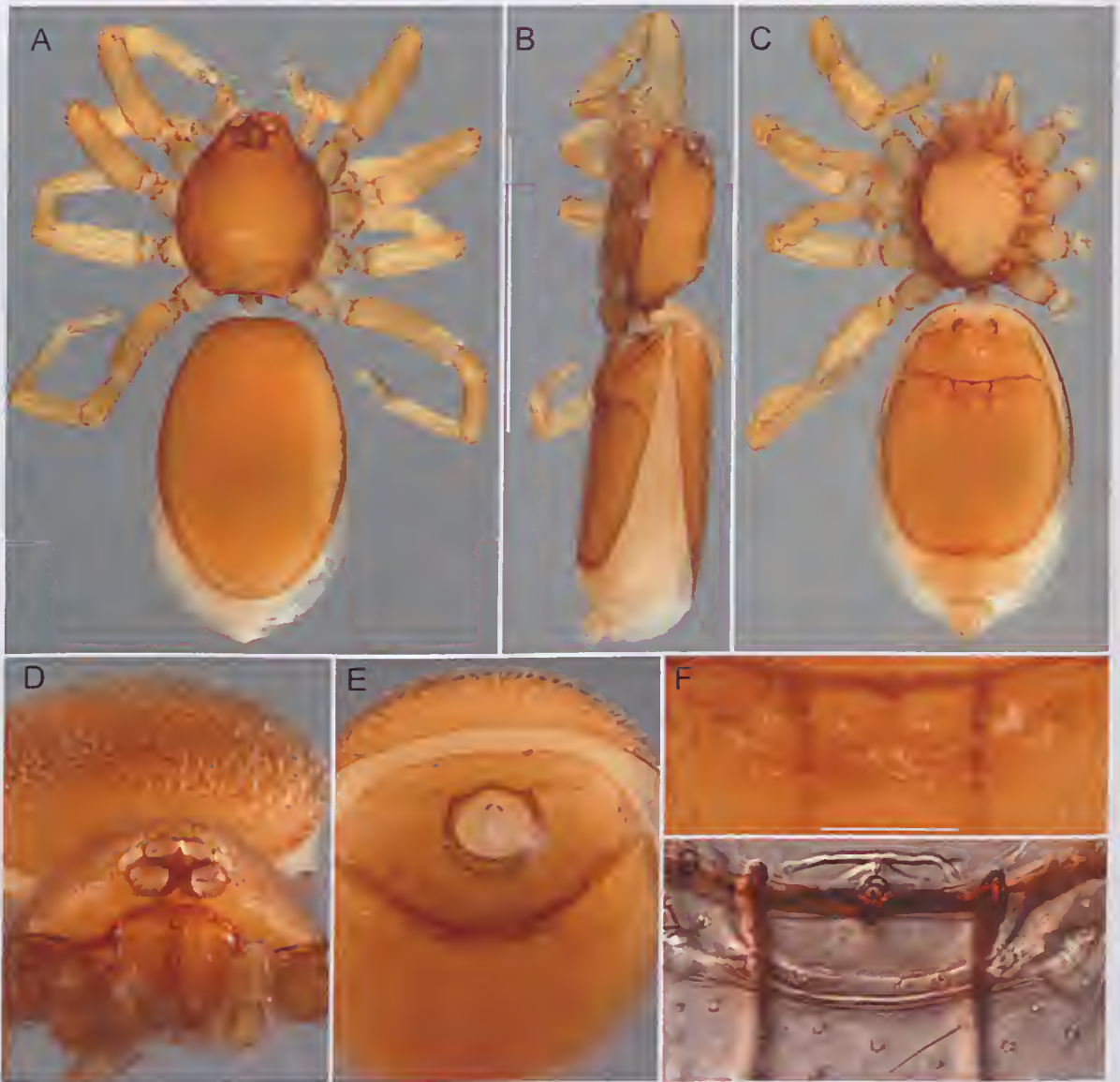


FIG. 129. *Opopaea millstream* Baehr and Harvey, sp. nov., female (PBI_OON 20193): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

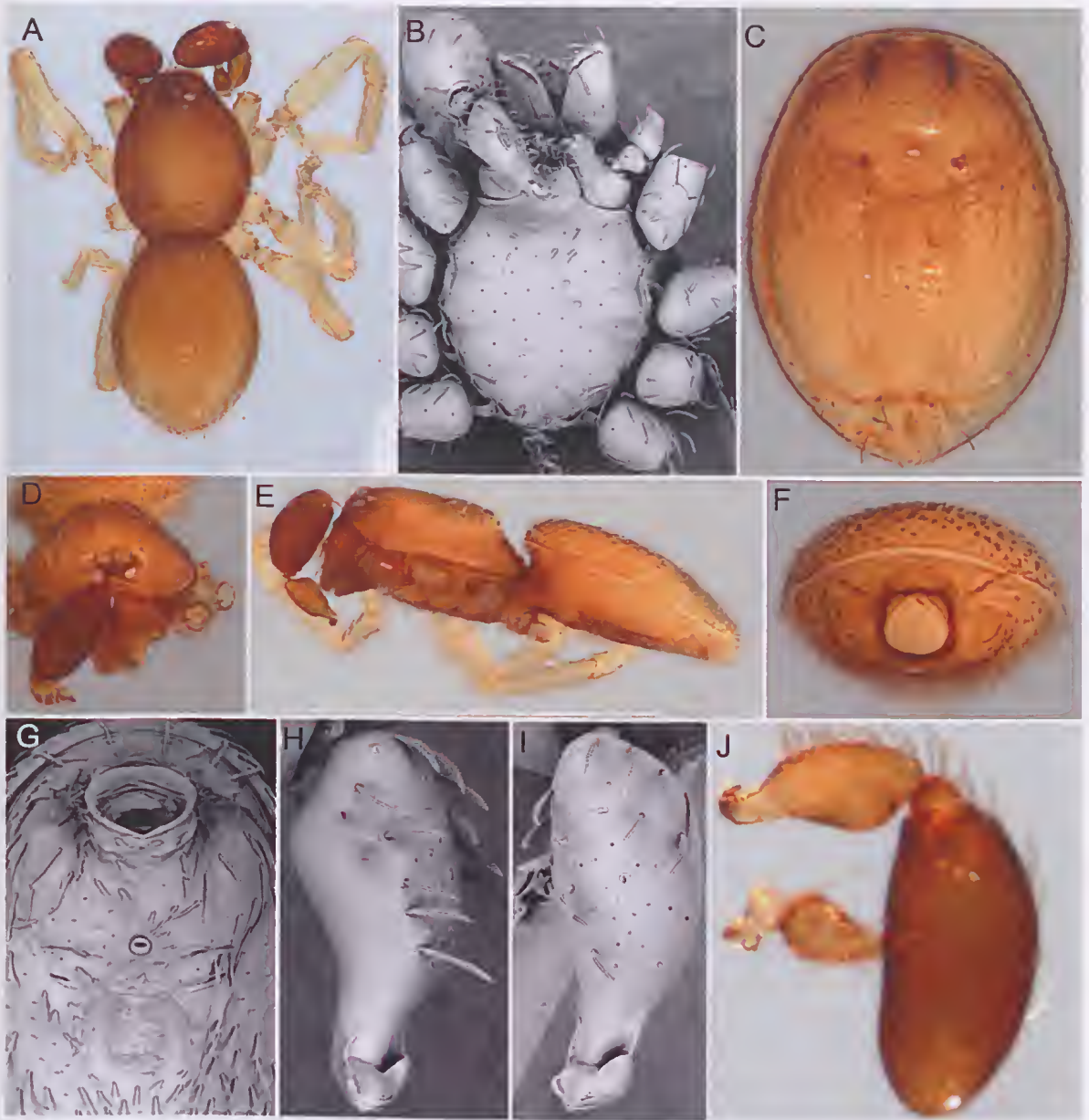


FIG. 130. *Opopaea nadineae* Baehr and Harvey, sp. nov., male (PBI_OON 04700 photo, SEM PBI_OON 48270): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, opisthosoma, anterior view; G, Epigastric area, ventral view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 131. *Opopaea nadineae* Baehr and Harvey, sp. nov., female (PBI_OON 48269): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, opisthosoma, anterior view; F, prosoma, posterior view; G, female epigyne, ventral view; H, same, dorsal view.

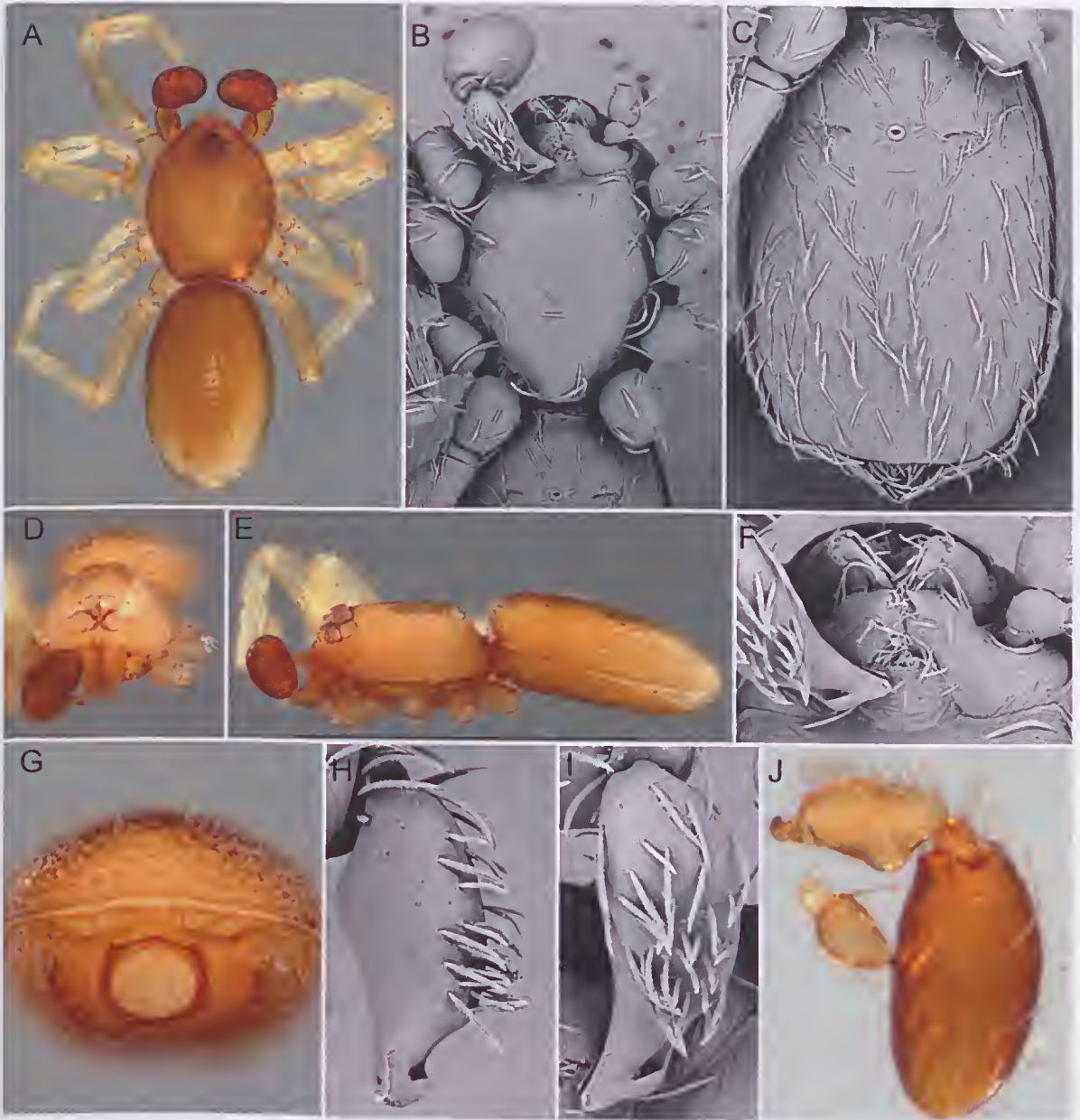


FIG. 132. *Opopaea pallida* Baehr and Harvey, sp. nov., male (PBI_OON 04598 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 133. *Opopaea pallida* Baehr and Harvey, sp. nov., female (PBI_OON 23679): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.



FIG. 134. *Opopaea pannawonica* Baehr and Ott, sp. nov., male (PBI_OON 04632 photo, PBI_OON 23618 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

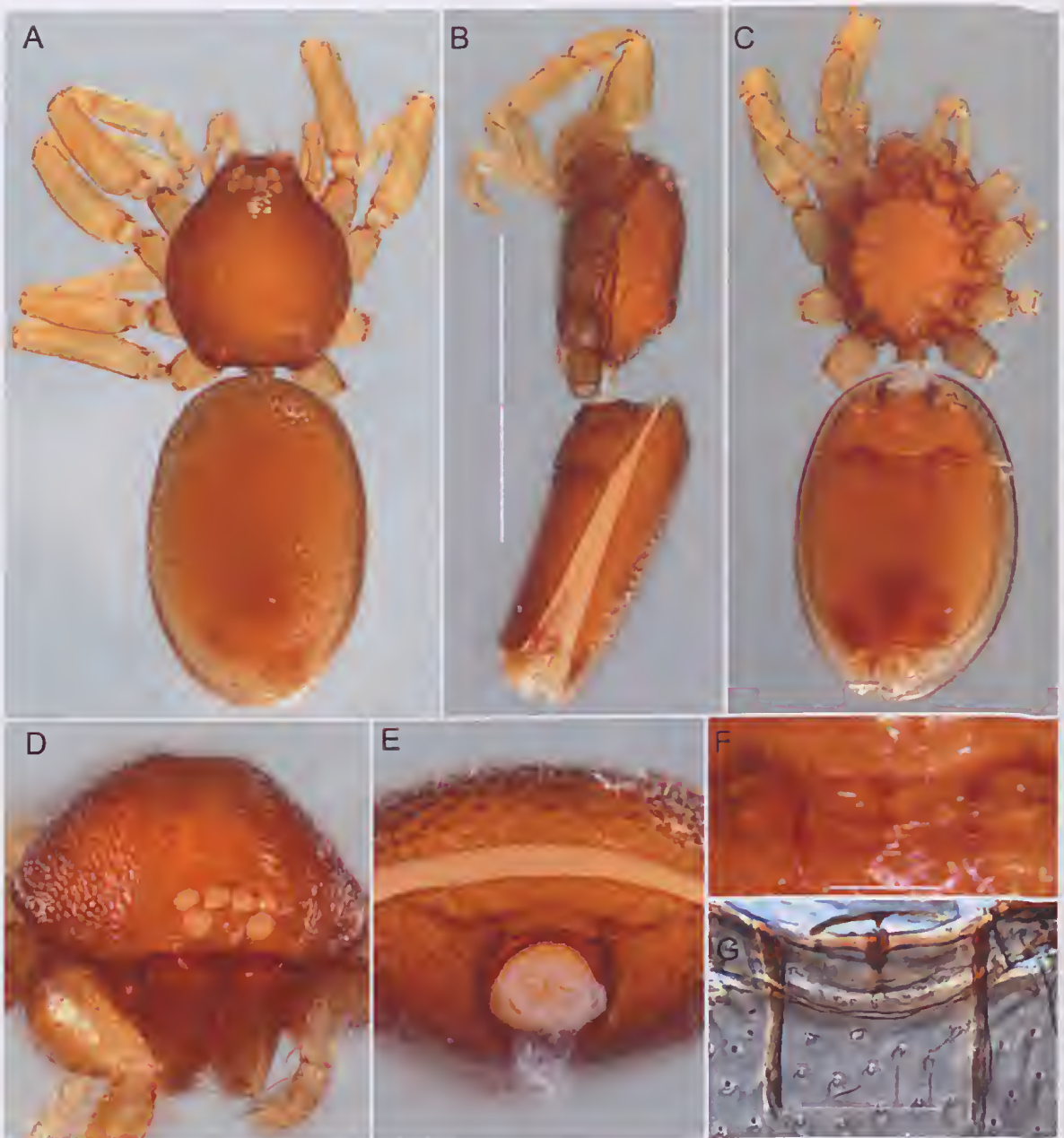


FIG. 135. *Opopaea pannawonica* Baehr and Ott, sp. nov., female (PBI_OON 23616): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

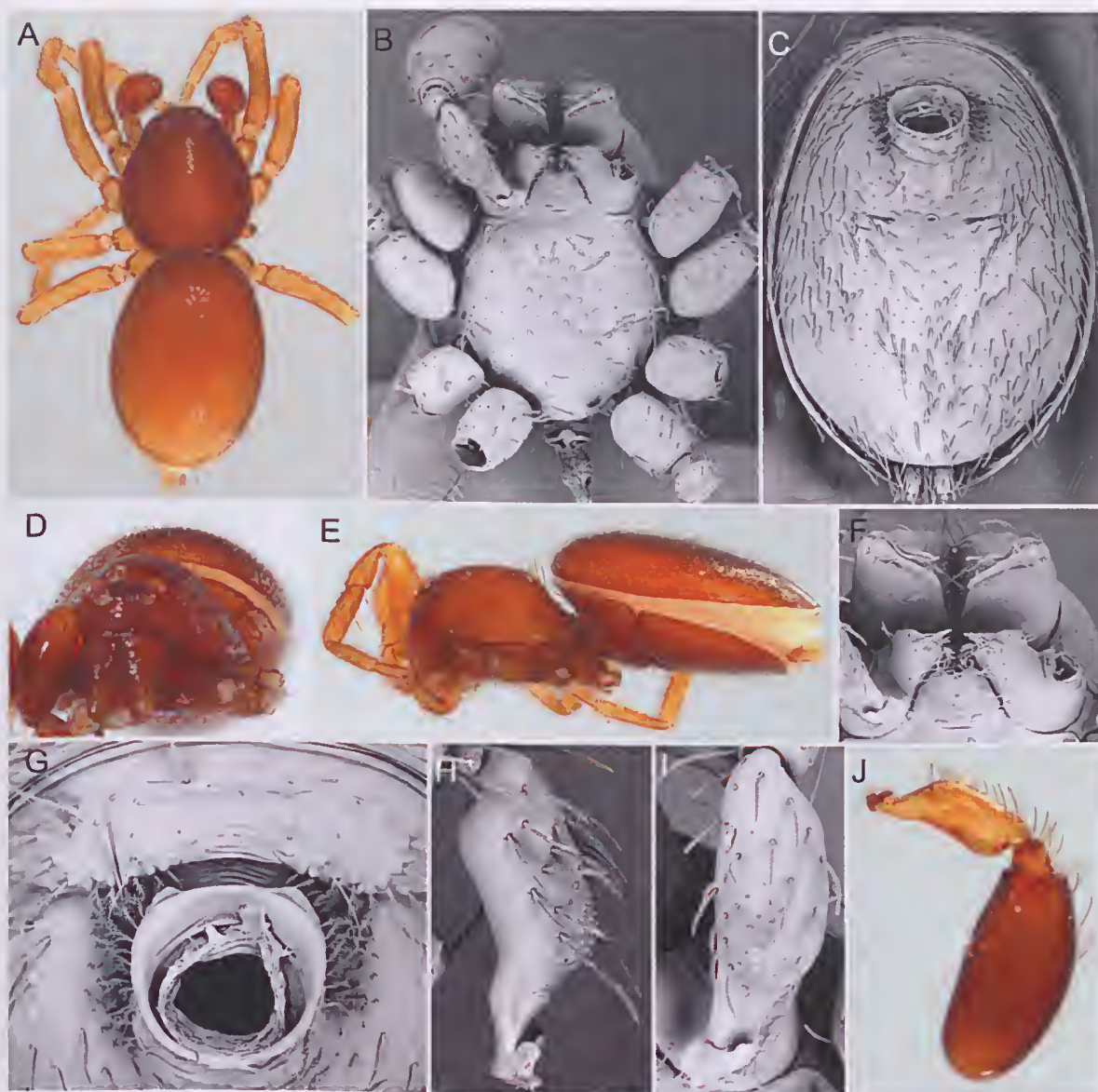


FIG. 136. *Opopaea pilbara* Baehr and Ott, sp. nov., male (PBI_OON 81875 photo, PBI_OON 23611 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

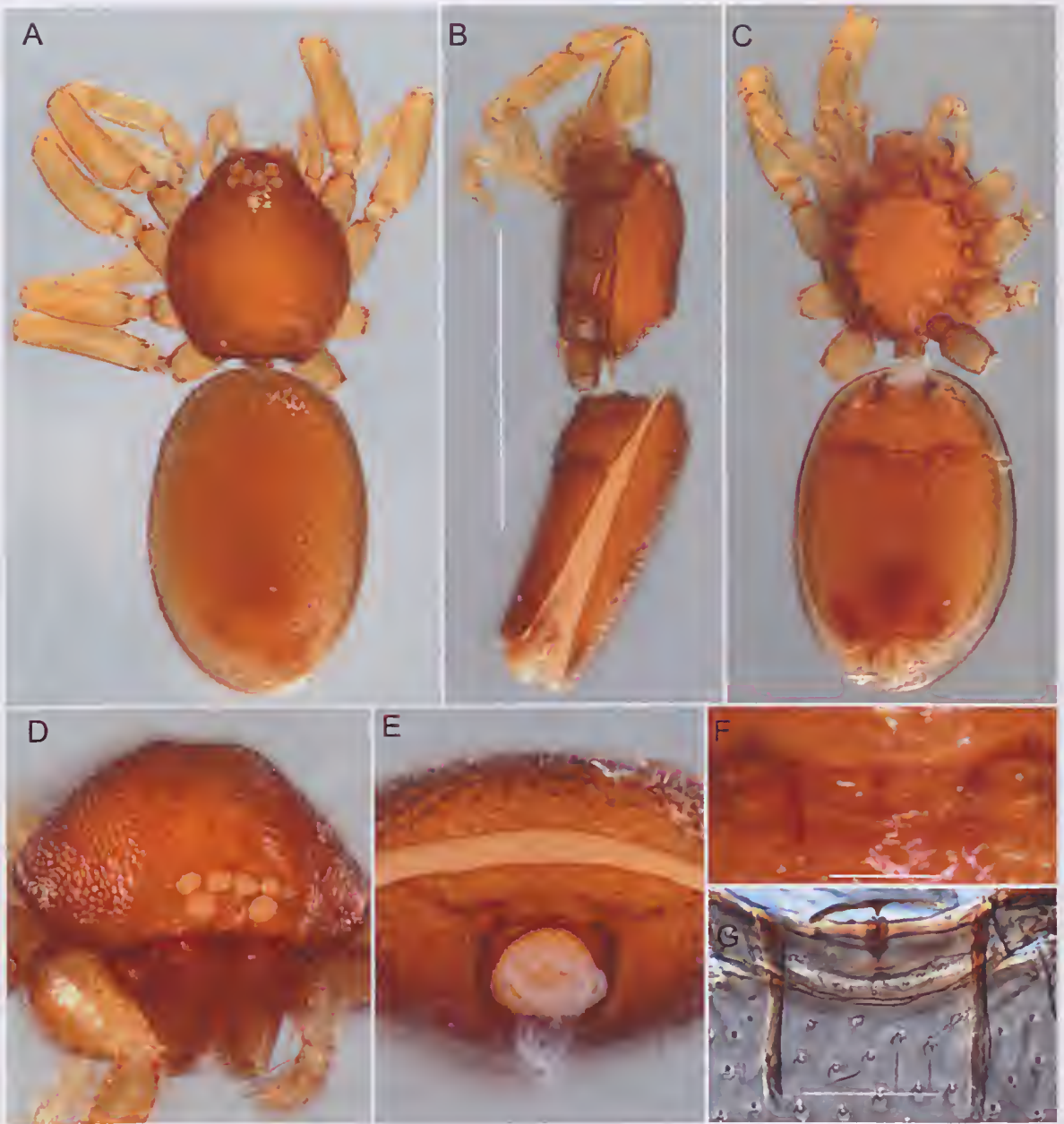


FIG. 135. *Opopaea pannawonica* Baehr and Ott, sp. nov., female (PBI_OON 23616): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

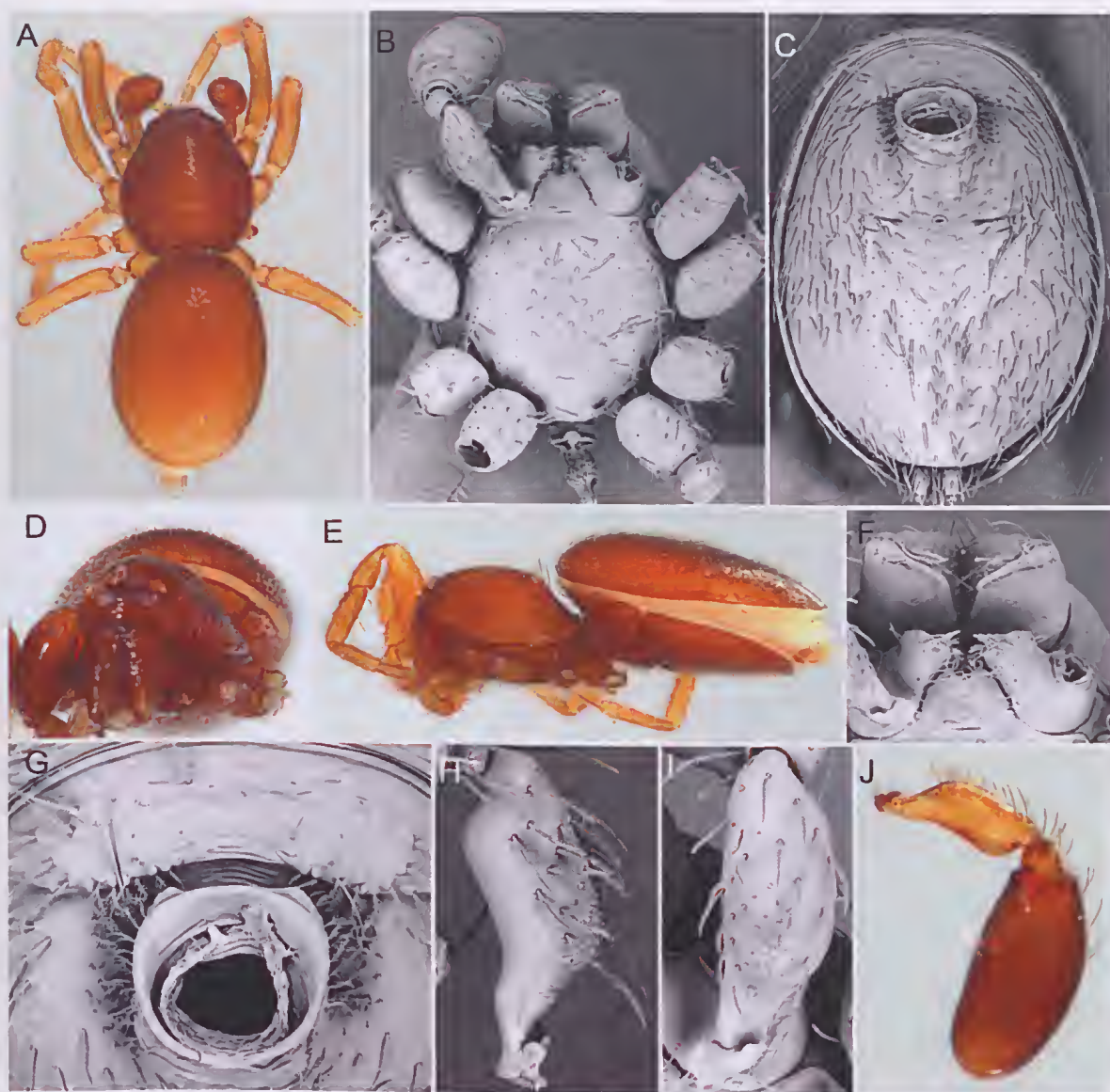


FIG. 136. *Opopaea pilbara* Baehr and Ott, sp. nov., male (PBL_OON 81875 photo, PBL_OON 23611 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

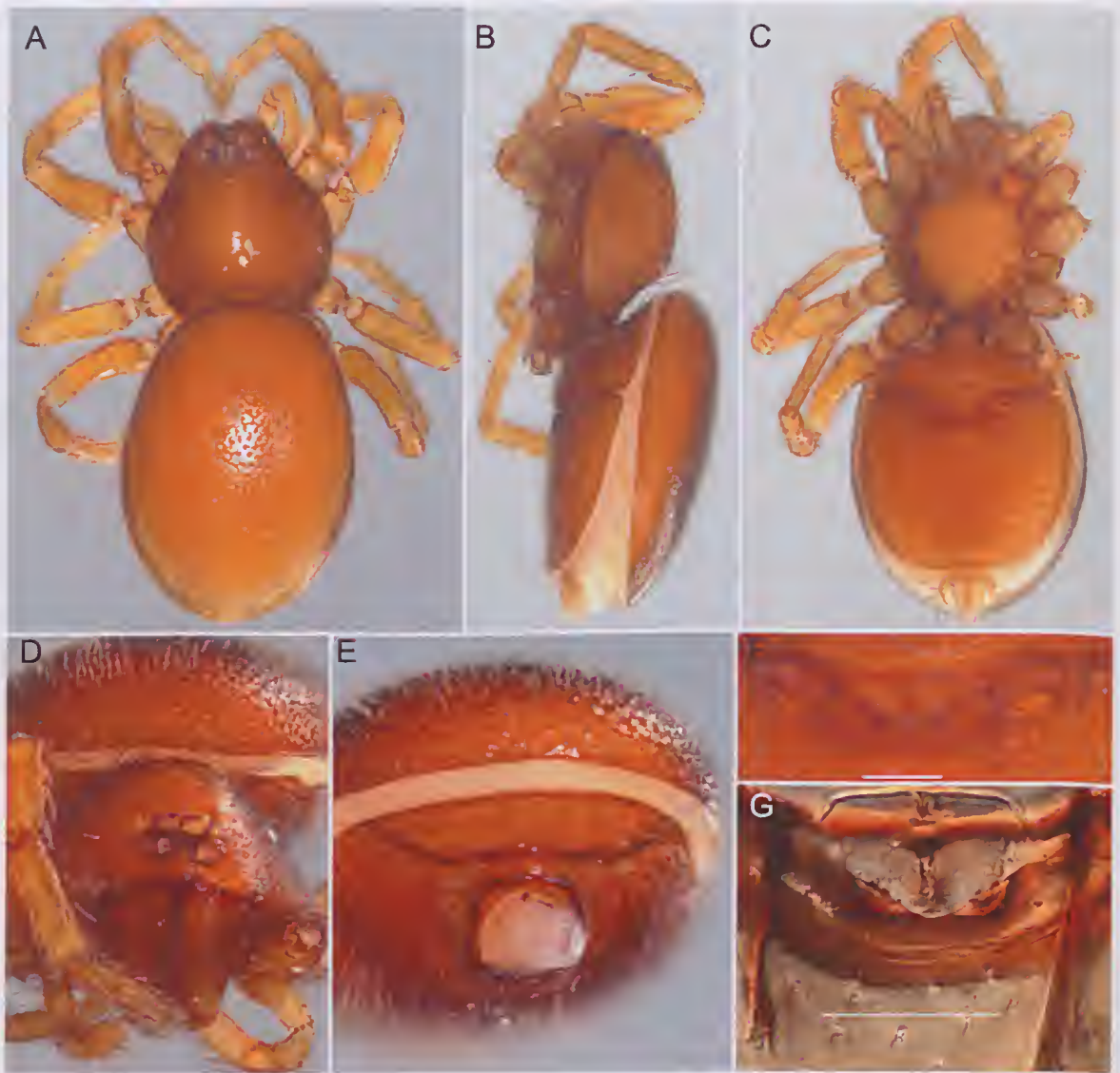


FIG. 137. *Opopaea pilbara* Baehr and Ott, sp. nov., female (PBI_OON 23610): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

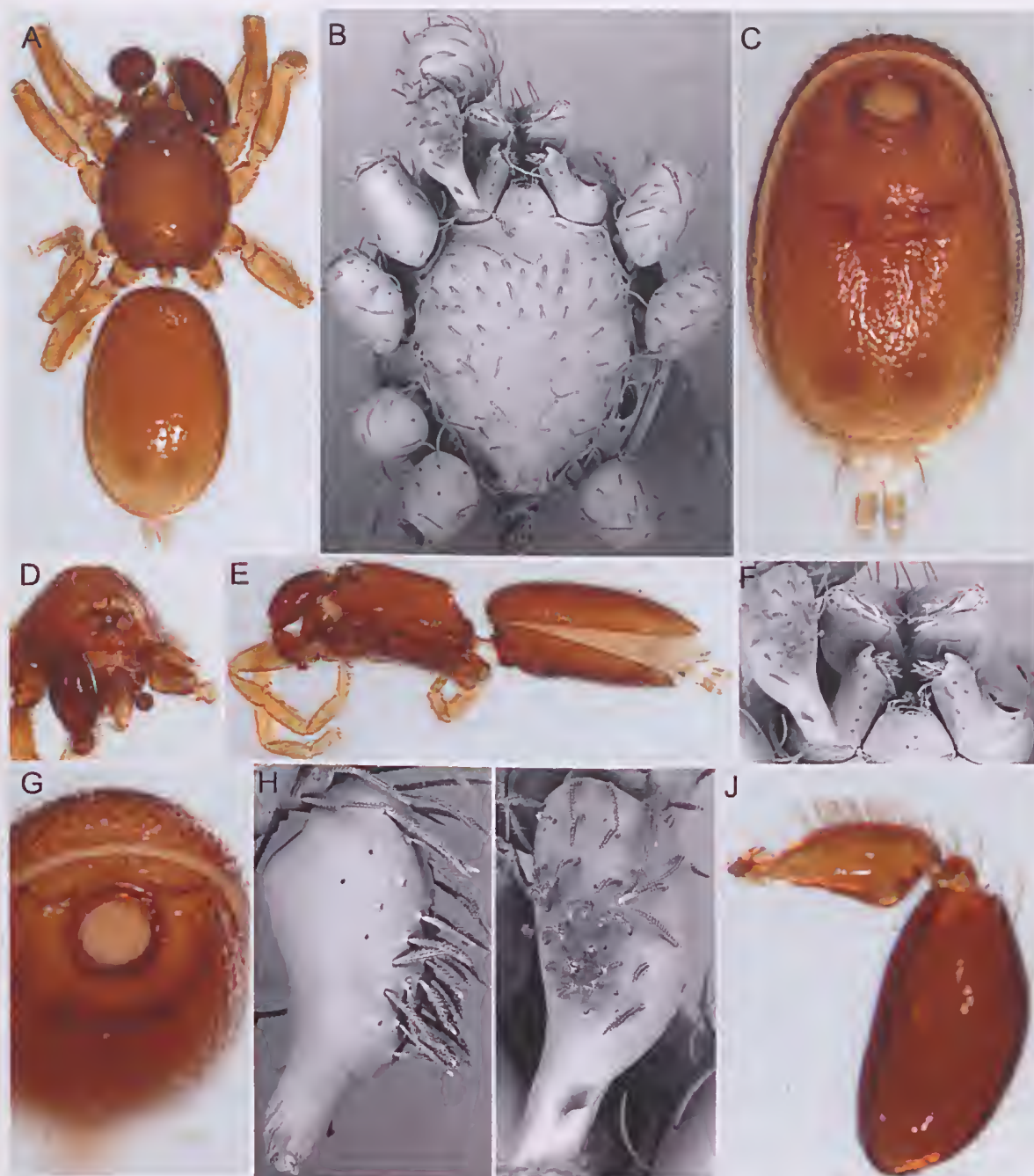


FIG. 138. *Opopaea rixi* Baehr and Harvey, sp. nov., male (PBI_OON 23633 photo, PBI_OON 18031 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

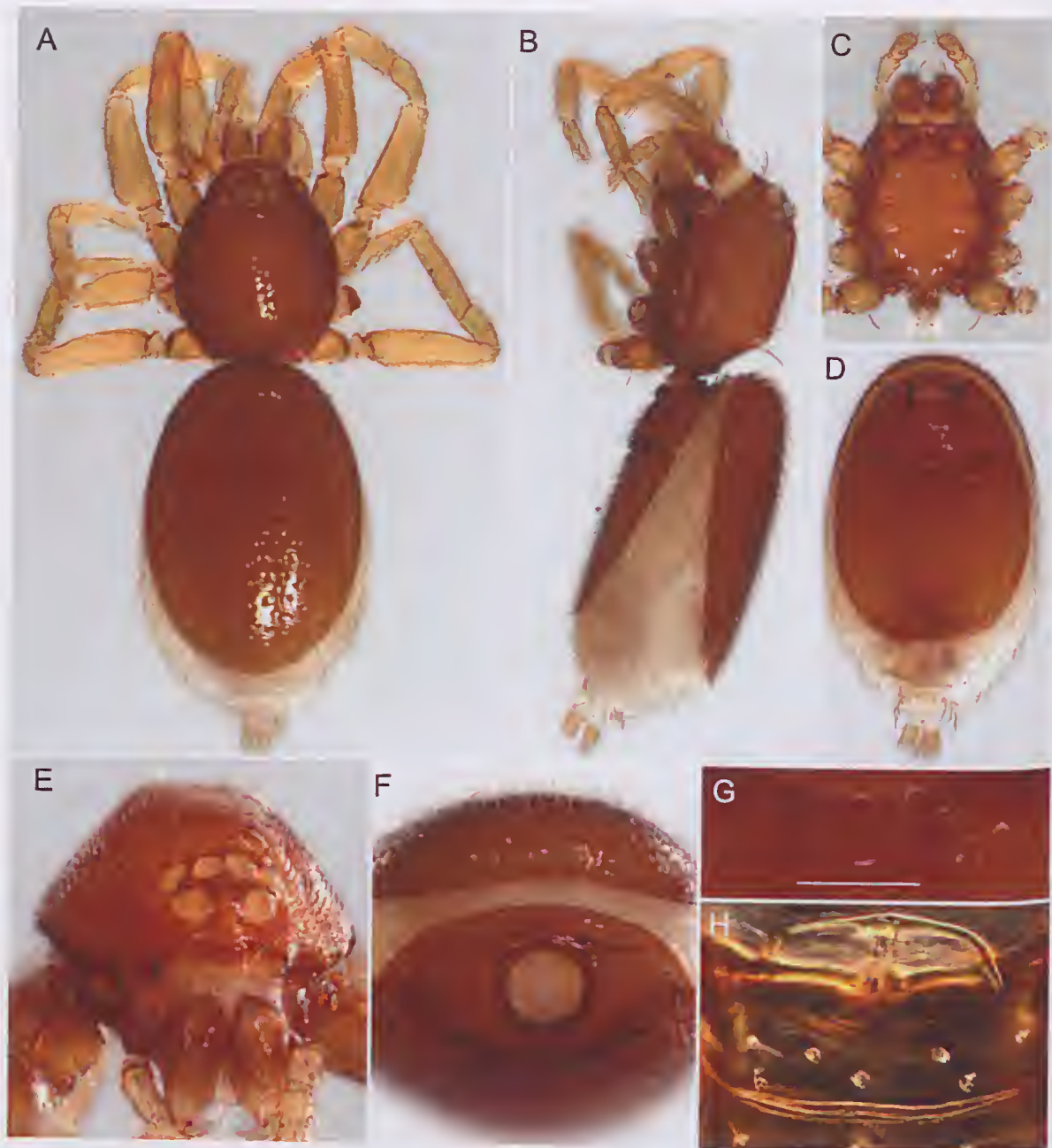


FIG. 139. *Opopaea rixi* Baehr and Harvey, sp. nov., female (PBI_OON 23634): A, habitus, dorsal view; B, same, lateral view; C, opisthosoma, ventral view; D, prosoma, ventral view; E, prosoma, anterior view; F, opisthosoma, anterior view; G, female epigyne, ventral view; H, same, dorsal view.

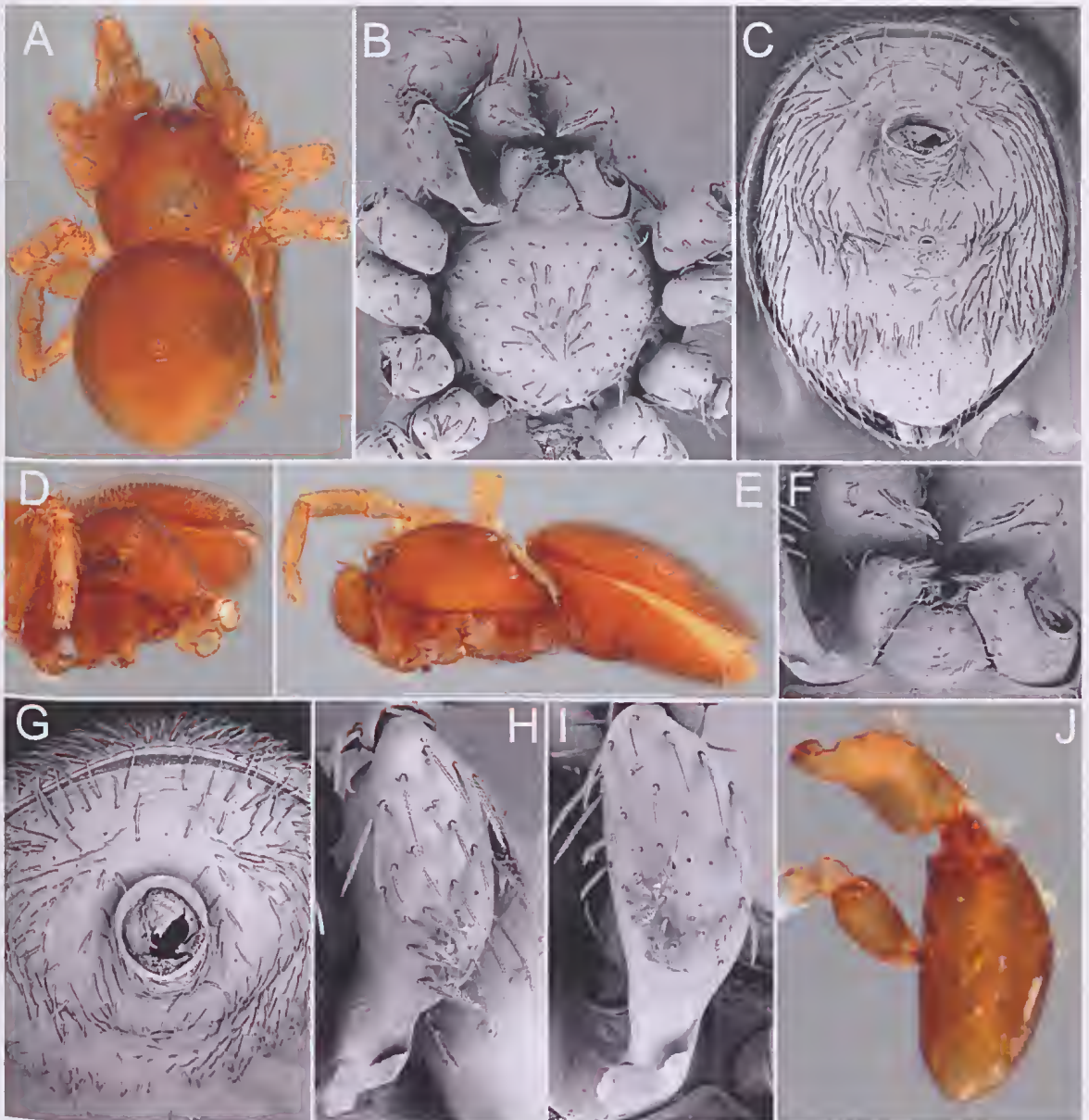


FIG. 140. *Opopaea robusta* Baehr and Ott, sp. nov., male (PBI_OON 04501 photo, PBI_OON 23627 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

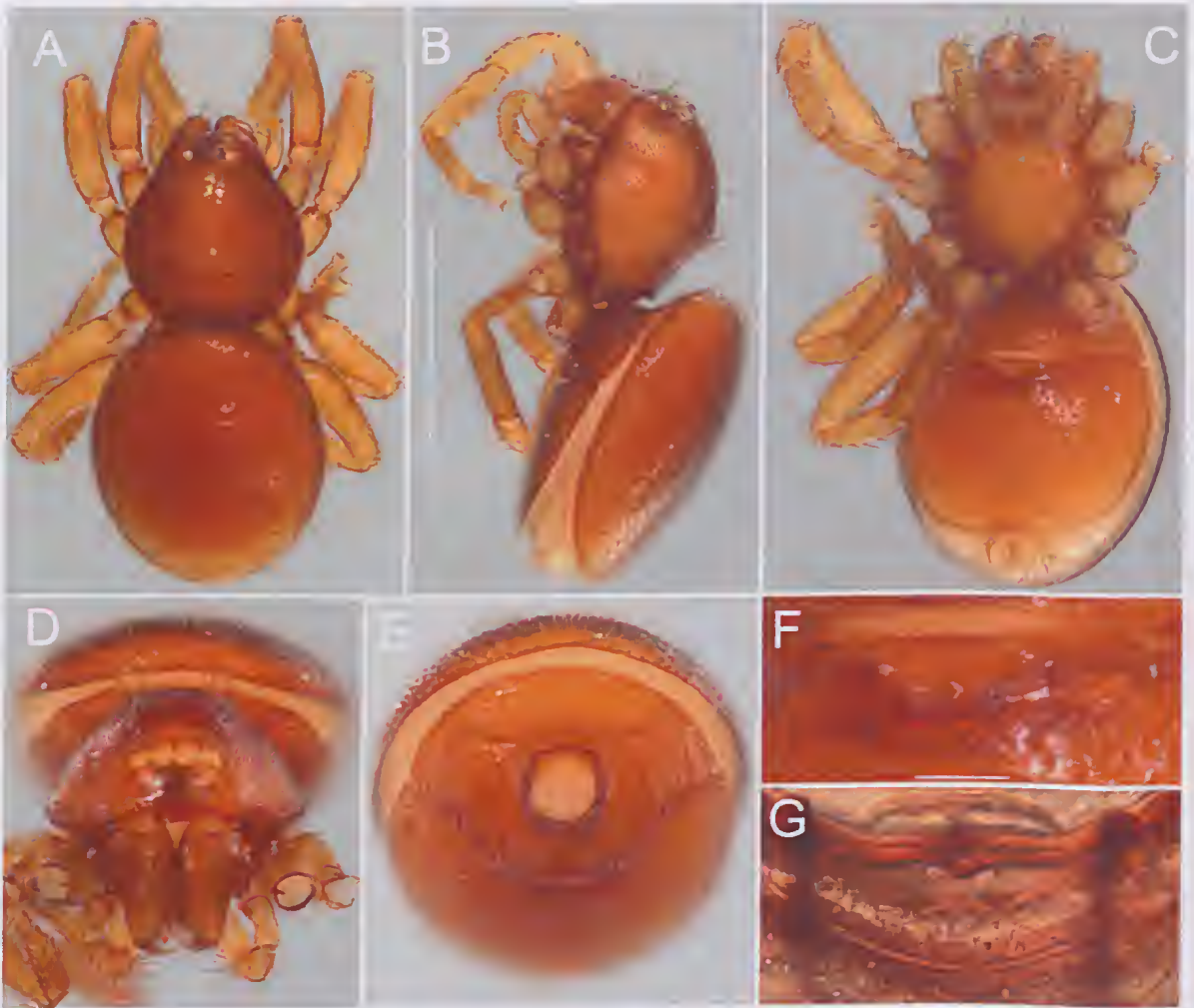


FIG. 141. *Opopaea robusta* Baehr and Ott, sp. nov., female (PBI_OON 04378): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

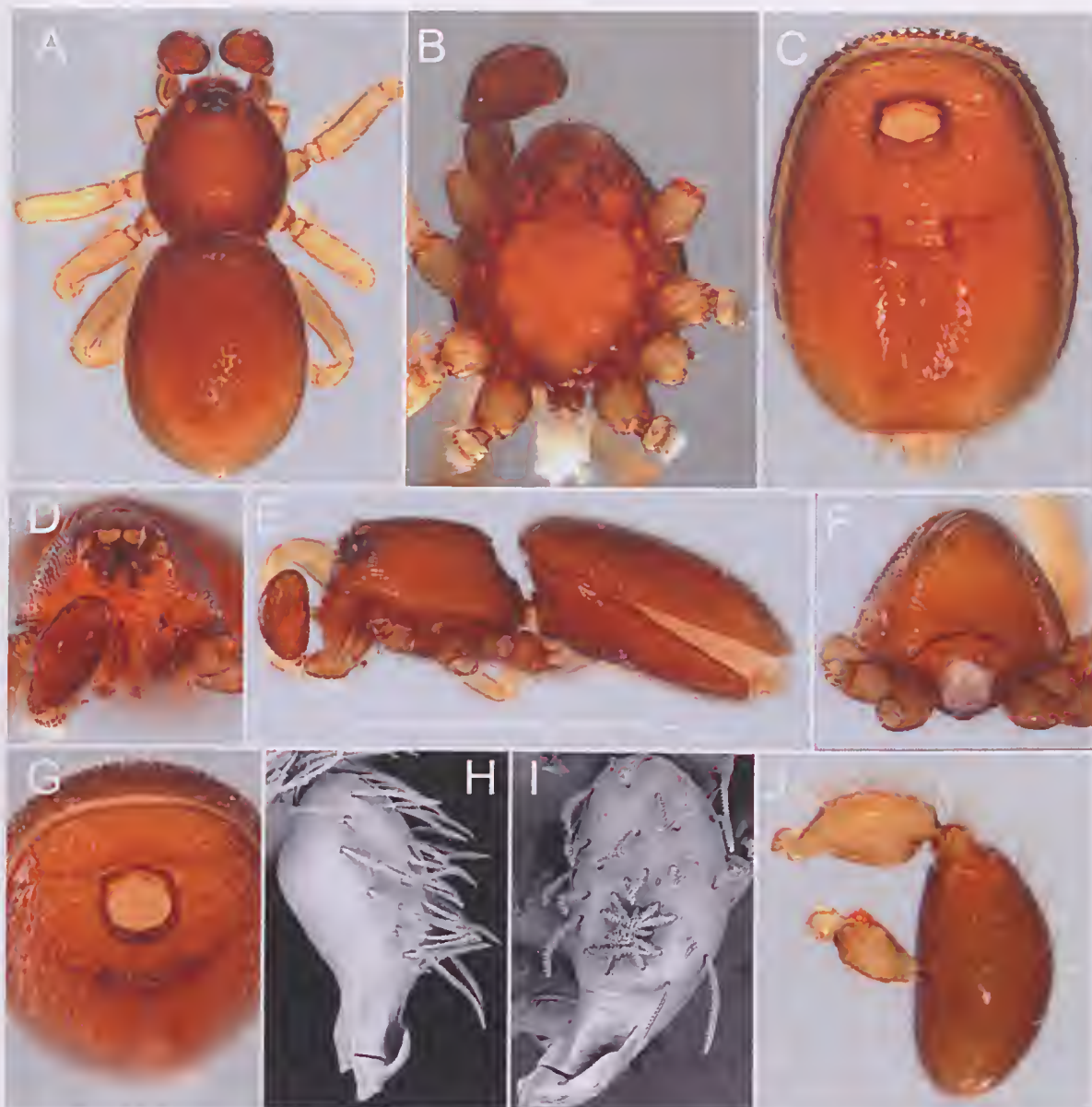


FIG. 142. *Opopaea rugosa* Baehr and Ott, sp. nov., male (PBI_OON 18059 photo, SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, posterior view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

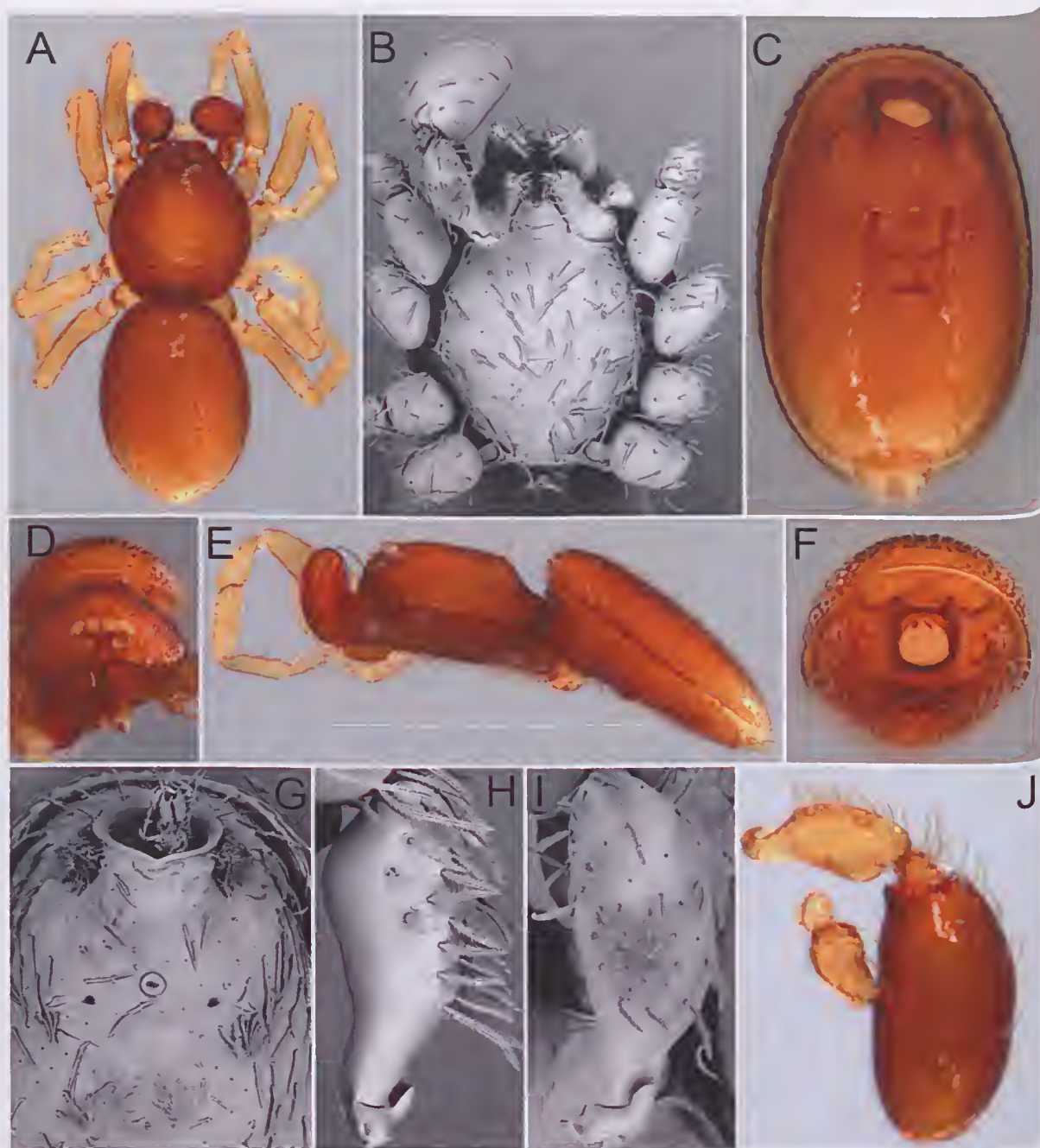


FIG. 145. *Opopaea triangularis* Baehr and Harvey, sp. nov., male (PBI_OON 04698 photo, PBI_OON 23631 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, prosoma, anterior view; G, Epigastric area, ventral view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

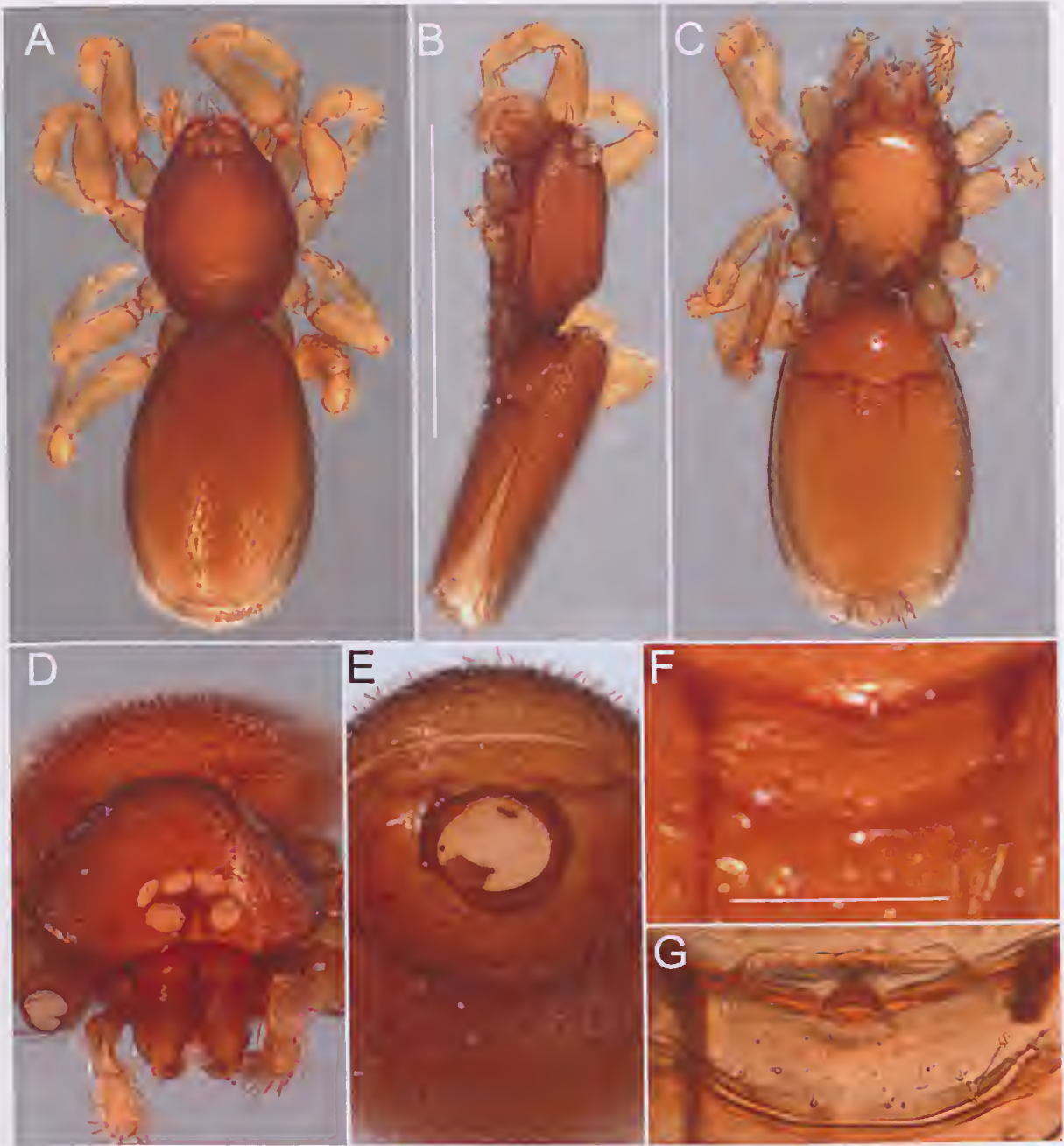


FIG. 146. *Opopaea triangularis* Baehr and Harvey, sp. nov., female (PBI_OON 23619): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

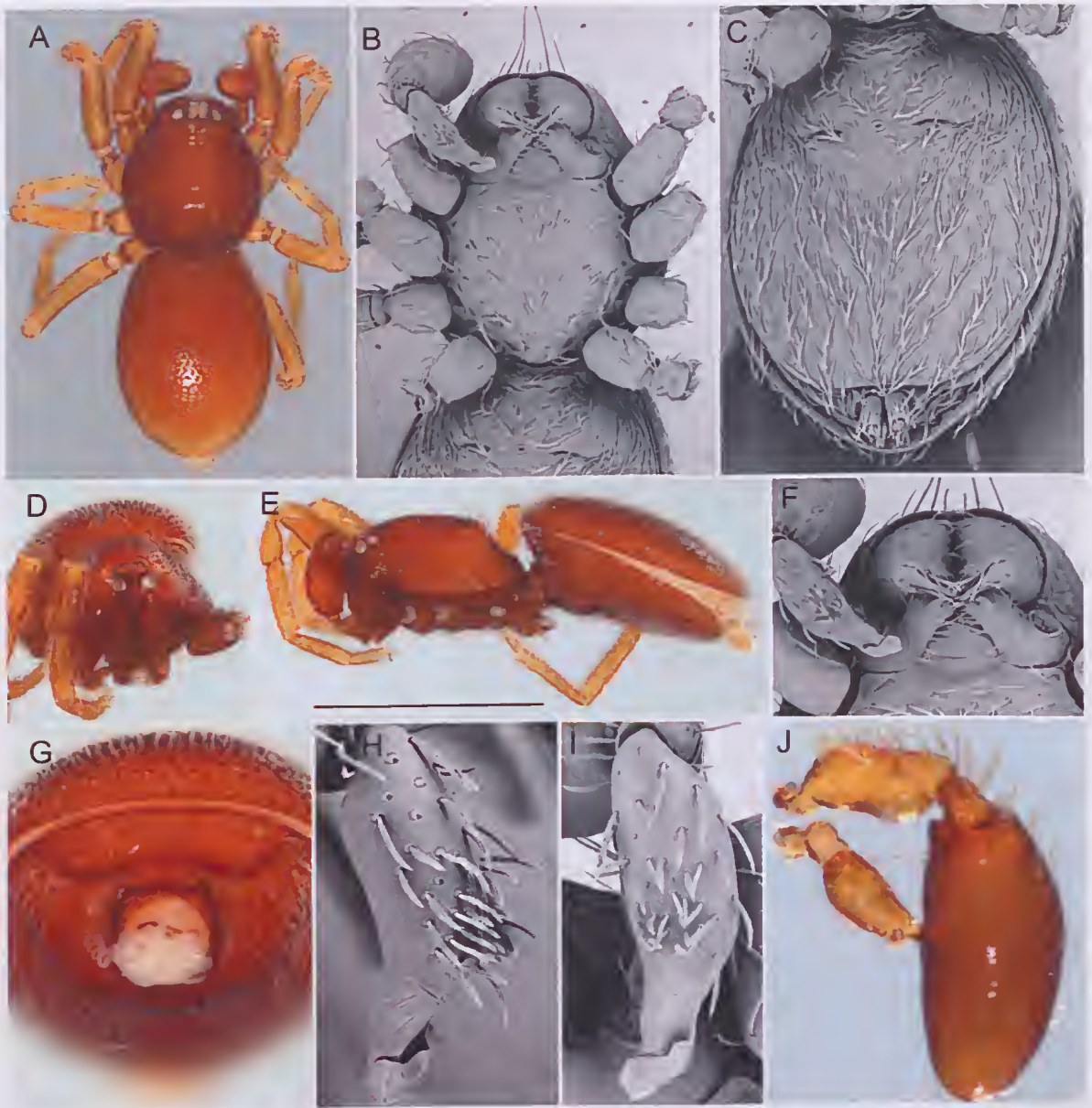


FIG. 147. *Opopaea wheelarra* Baehr and Ott, sp. nov., male (PBI_OON 04471 photo, PBI_OON 23611 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

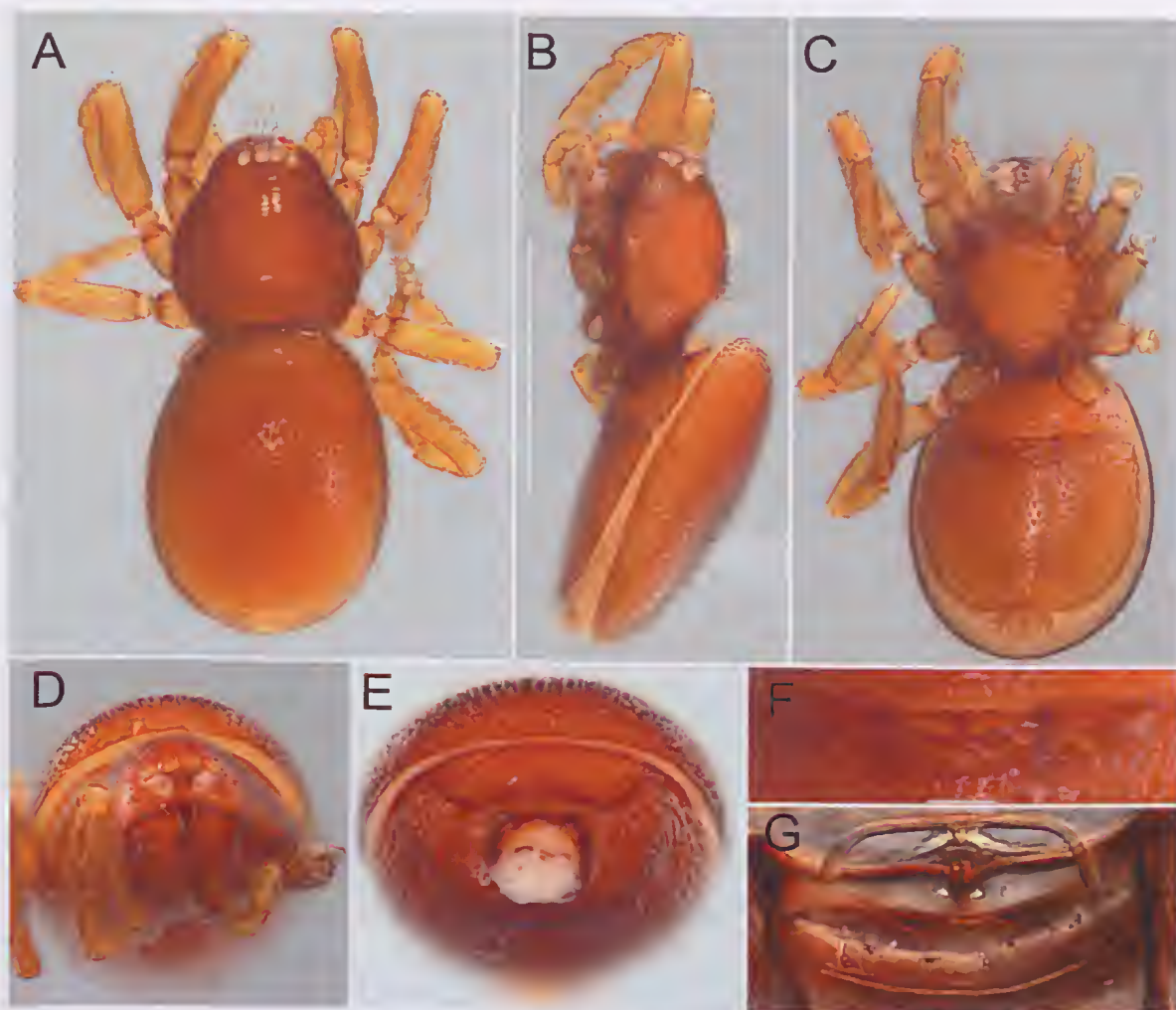


FIG. 148. *Opopaea wheelarra* Baehr and Ott, sp. nov., female (PBI_OON 04471): A, habitus, dorsal view; B, same, lateral view; C, same, ventral view; D, prosoma, anterior view; E, opisthosoma, anterior view; F, female epigyne, ventral view; G, same, dorsal view.

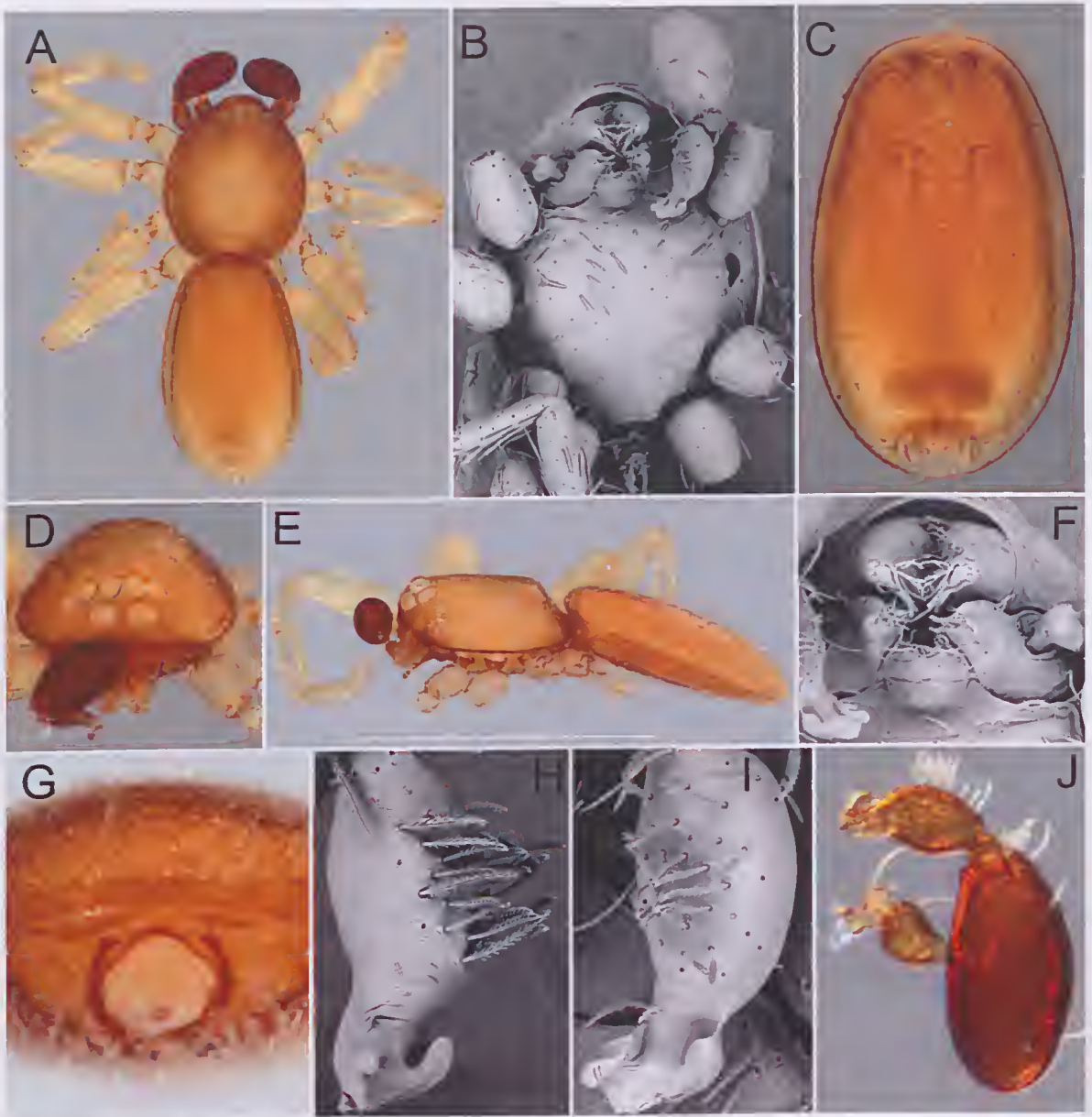


FIG. 149. *Opopaea whim* Baehr and Harvey, sp. nov., male (PBI_OON 04648 photo, PBI_OON 04658 SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, opisthosoma, anterior view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.

The new Australian Ground-Hunting Spider Genus *Leichhardtus* (Araneae: Corinnidae)

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ABSTRACT

The new corinnid genus *Leichhardtus* is described including eight new species from eastern Australia: *L. albofasciatus*, *L. badius*, *L. bimaculatus*, *L. conopalpis*, *L. garretti*, *L. kroombit*, *L. reinhardi* and *L. terriirwinae*. A key to the species is provided. Only one species is widely distributed, four species are collected only in rainforests and three species are recorded only from a single location. □ *Biogeography, Morphology, New Species, Taxonomy, Corinnidae.*

Ground-hunting spiders of the family Corinnidae are among the most diverse of the ground spider families with 1014 described species in 87 genera (Platnick 2012). These very fast medium-sized runners have a highly variable somatic morphology ranging from species with soft abdomens to those with leathery scutes covering the whole dorsum. The corinnid fauna is most diverse in tropical and subtropical regions (Bonaldo & Brescovit 2005; Haddad 2006a, b; Haddad & Bosselaers 2010; Lyle & Haddad 2010). Up until now, 19 corinnid species in six genera have been described from Australia. The new genus *Leichhardtus* belongs, together with *Coriinuomma* Karsch, 1880, *Medmassa* Simon, 1887, *Methesis* Simon, 1896, *Pocilipta* Simon, 1897, and *Supunna* Simon, 1897, to the subfamily Castianeirinae. *Leichhardtus* differs from all other described Australian Castianeirinae genera in having an enlarged palpal femur in males, and males and females in having four pairs of spines on ventral tibiae I and II.

Bush Blitz 2010 and 2011 to Dananbilla Nature Reserve (New South Wales) and Ned's Corner (Victoria) yielded key specimens from an unknown ground hunting spider genus

(Corinnidae). A Bush Blitz Tactical Taxonomy Grant presented the opportunity to revise this new genus, expanding our knowledge of the unique Biodiversity of Australia's fauna. Of the species discovered, the rainforest species are most likely short range endemics (Harvey 2002) and may prove to be important taxa for monitoring the effects of climate change (Baehr 2011; Baehr, Raven & Hebron 2011).

MATERIAL AND METHODS

Specimens are preserved in 75% ethanol and were examined using a Leica MZ16A microscope. Photomicrographical images were produced using a Leica DFC 500 and the software program Auto-Montage Pro Version 5.02 (p). The scanning electron micrographs were taken with a Hitachi S-530 scanning electron microscope. Epigynes and palps were drawn with a camera lucida on a Zeiss Stemi SV6 microscope. The specimens are lodged in: AM, Australian Museum, Sydney; MV, Museum Victoria, Melbourne; QM, Queensland Museum, Brisbane; WAM, Western Australian Museum, Perth. All measurements are in millimetres. Abbreviations are used in the text as follows: AME, anterior median eyes; ALE, anterior lateral eyes; ALS, anterior

lateral spinnerets; CO, copulatory opening; ED, epigynal duct; S, spermatheca; PLE, posterior lateral eyes; PLS, posterior lateral spinnerets; PME, anterior median eyes; PMS, posterior median spinnerets; RCH, retrocoxal hymen.

The species descriptions contain only the differences from the generic description. The description of the females includes only the differences from the male.

SYSTEMATICS

Family Corinnidae Karsch, 1880

Leichhardtus Raven & Baehr, new genus

Type species. *Leichhardtus conopalpis* sp. nov.

Etymology. The generic name is in honour of the German explorer and scientist, Ludwig Leichhardt (1813–1848), who came to Australia in 1842 to study its wildlife. This is for his 200th Birthday in 2013.

Diagnosis. Differs from all other Australian Castianeirinae genera in having an enlarged palpal femur, four pairs of spines on ventral tibiae I and II; females have a pair of open crescentic fossae in biconvex configuration with a narrow curving insemination duct leading to two similarly large pear-shaped receptacula.

Description. *Male:* total length 6.09–9.63. *Colour:* Prosoma, mouthparts yellow orange to dark brown, legs yellow orange to yellow brown with or without dark markings. *Opisthosoma* dark brown with or without pale spots or chevrons. *Prosoma:* pyriform in dorsal view, head narrowed to about 0.60, widest at middle, pars cephalica flat in lateral view, with rounded posterolateral corners, surface granulate, with fovea at middle of carapace, lateral margin rebordered. Clypeus straight in front view, vertical in lateral view, with divided chilum, high, ALE separated from edge of carapace by 1.5–2 times their diameter. *Eyes:* eight, well developed, equal sized or AME largest; all eyes circular; posterior eye row procurved from above. *Sternum* (Fig. 3C) heart-shaped, surface punctated. *Chelicerae* straight, base laterally bulging, promargin with 3 teeth, retromargin with 2 teeth, paturon with distal lobe covered with fringe of long setae. Labium rectangular,

anterior margin straight with white seam and line of strong setae. Endites rectangular, twice as long as labium, with white seam, anteromedian part with brush-like structure; serrula present in single row. *Opisthosoma:* ovoid, rounded posteriorly (Fig. 3A) with or without large oval dorsal scute covering $\frac{1}{2}$ – $\frac{3}{4}$ of abdomen, venter with yellow orange epigastric scute. *Spinnerets* (Fig. 7H): PLS slightly larger than PMS, two-segmented with 3 enlarged spigots and 3 enlarged spigots on PMS in females. Only one enlarged spigot on inner ALS. *Legs:* Coxae entally rounded with slight retrobasal process; RCH small; trochanters symmetrically notched about twice as wide as deep, similar on all legs; no feathery hairs on legs; covered mostly by bristles; tarsi cylindrical. *Trichobothria:* tarsi & metatarsi with few (2–4 evident) short distally; tibia with cluster of trichae basally; spines, I: femur p1d3; tibia v2.2.2.2; metatarsus v2.2. II: femur p2d3; tibia p2v2.2.2.2; metatarsus v2.2. III: femur p3d3r3; tibia p2d2r2v2.2.2; metatarsus p3r3v2.2.2. IV: femur p2d3r1; tibia p2d3r2v2.2.2; metatarsus p3r3v2.2.2. *Palp:* femur p1d2; patella p1; tibia p2. *Claws.* Enclosed in short dense tufts; claws and tufts on legs I and II very small, lower than diameter of tarsi; longer with 3–4 small teeth on legs III, IV. *Scopula.* Fringe of short scopuliform hairs on ventral tarsi I–IV and for distal half (I, II) to one quarter (III, IV) of metatarsi. *Palp:* Femur enlarged or with conical process ventrally. Tibia cylindrical but with distinct glabrous saddle distoventrally for half of prolateral edge where small process interlocks with ovoid depression on opposed cymbial edge. Cymbium with sinuous retrolateral margin with or without conical spine-like process. Bulb pyriform with corkscrew-shaped embolus. Sperm duct folds back strongly toward embolus then reflexes back sharply; round base of short embolus with reflexed flattened apex.

Female. Total length 6.83–9.71. *Abdomen:* with or without small dorsal scute. *Epigyne* (Fig. 3J, K) about as long as wide, longer than wide or wider than long, copulatory openings (CO) near lateral margin about halfway between epigastric fold and anterior end of epigyne, epigynal ducts short, semicircular, laterally connected to S-shaped spermathecae, spermathecae anterior part pear-shaped smooth with small lateral glandulae, posterior part with 4–5 diverticulae.

KEY TO SPECIES OF *LEICHHARDTEUS*

1. Males 2
 - Females (unknown for *L. bimaculatus*, *L. terriirwiniae*) 9
2. Palpal femur with conical ventral process (Figs 3I, 7I, 10G) 3
 - Palpal femur without conical ventral process (Figs 4I, 5H, 6G, 8G, 9I) 5
3. Carapace yellow orange front dark brown (Figs 1, 3A) *L. conopalpis*
 - Carapace dark unicoloured (Fig. 7A, 10A) 4
4. Cymbium without retrolateral spine (Fig. 7K) *L. garretti*
 - Cymbium with well developed retrolateral spine (Fig. 10G) *L. terriirwiniae*
5. Carapace yellow orange front dark brown (Figs 9A) *L. reinhardi*
 - Carapace unicoloured 6
6. Opisthosoma with pale dorsomedian stripe (Fig. 4A) *L. albofasciatus*
 - Opisthosoma without median stripe 7
7. Opisthosoma dorsally dark, with 1 pair of pale spots (Fig. 6A) *L. bimaculatus*
 - Opisthosoma different 8
8. Opisthosoma with pale dorsal chevrons covering all (Fig. 5A) *L. badius*
 - Opisthosoma with pale dorsal chevrons only in front (Fig. 8A) *L. kroombit*
9. Carapace yellow orange front dark brown (Figs 1, 9B) 10
 - Carapace unicoloured (Figs 4B, 5B, 7B, 8B) 11
10. Opisthosoma completely dark brown (Fig. 9B) *L. reinhardi*
 - Opisthosoma with small arrow-shaped pale spot posteriorly (Fig. 3B) *L. conopalpis*
11. Opisthosoma with pale dorsomedian stripe (Fig. 4B) *L. albofasciatus*
 - Opisthosoma different 12
12. Opisthosoma with pale dorsal chevrons covering all (Fig. 5B) *L. badius*
 - Opisthosoma with pale dorsal chevrons only in front (Fig. 8B) 13
13. Copulatory opening inverted u-shaped posteriorly open (Fig. 7L) *L. garretti*
 - Copulatory opening circular (Fig. 8J) *L. kroombit*



FIG. 1. *Leichhardtus conopalpis*, habitus.



FIG. 2. Bulbal tips. A, *Leichhardtia conopalpis* (QM S92473); B, *L. garretti* (QM S68111); C, *L. binaculatus* (QM S14709); D, *L. kroombit* (QM S92472); E, *L. terriirwiniae* (QM S38609); F, *L. albofasciatus* (QM S25194); G, *L. reinhardi* (S92342); H, *L. badius* (QM S31555). Scale 0.1 mm.



FIG. 3. *Leichhardteus conopalpis*, male (QM S52729), female (QM S53920). A, Habitus, dorsal view, male; B, Same, female; C, Habitus, ventral view, male; D, Same, female; E, Prosoma, frontal view, male; F, Mouthparts, ventral view, female; G, Male palp, prolateral view; H, Male palp, ventral view; I, Male palp, retrolateral view; J, Female epigyne ventral view; K, Female epigyne dorsal view. Scale 1 mm, epigyne 0.1 mm.



FIG. 4. *Leichhardtia albofasciatus*, male (QM S29577), female (QM S76352); A, Habitus, dorsal view, male; B, Same, female; C, Habitus, dorsal view, male; D, Same, female; E, Prosoma, frontal view, male; F, Same, female; G, Male palp, prolateral view; H, Same, ventral view; I, Same, retrolateral view; J, Female epigyne ventral view; K, Female epigyne dorsal view. Scale 1 mm; epigyne, 0.1 mm.

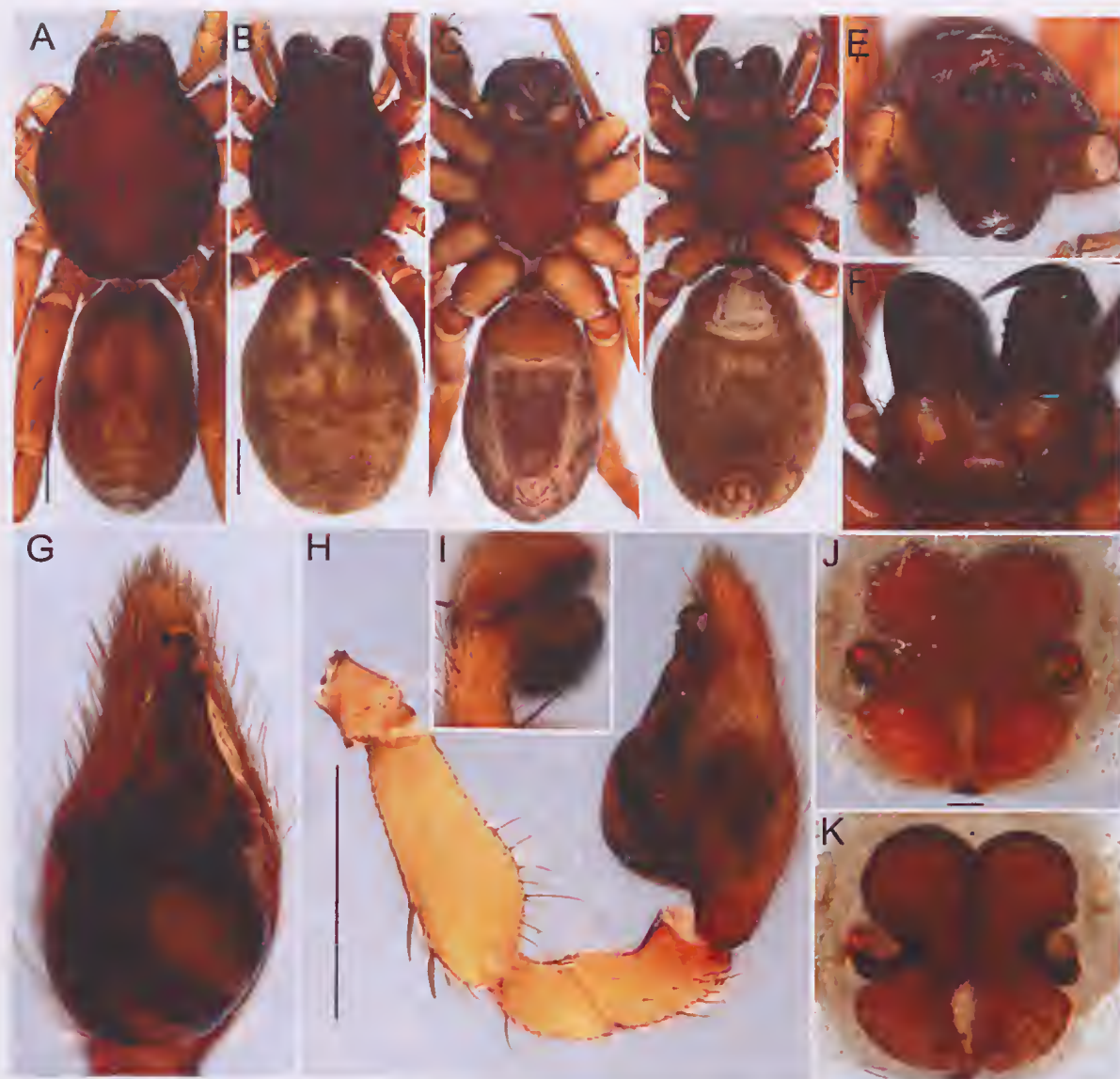


FIG. 5. *Leichhardteus badius*, male (QM S31555), female (QM S31545). A, Habitus, dorsal view, male; B, Same, female; C, Habitus, ventral view, male; D, Same, female; E, Prosoma, frontal view, male; F, Mouthparts, ventral view, female; G, Male palp, ventral view; H, Same, retrolateral view; I, Same, dorsal view (spine); J, Female epigyne ventral view; K, Female epigyne dorsal view. Scale 1 mm; epigyne, 0.1 mm.

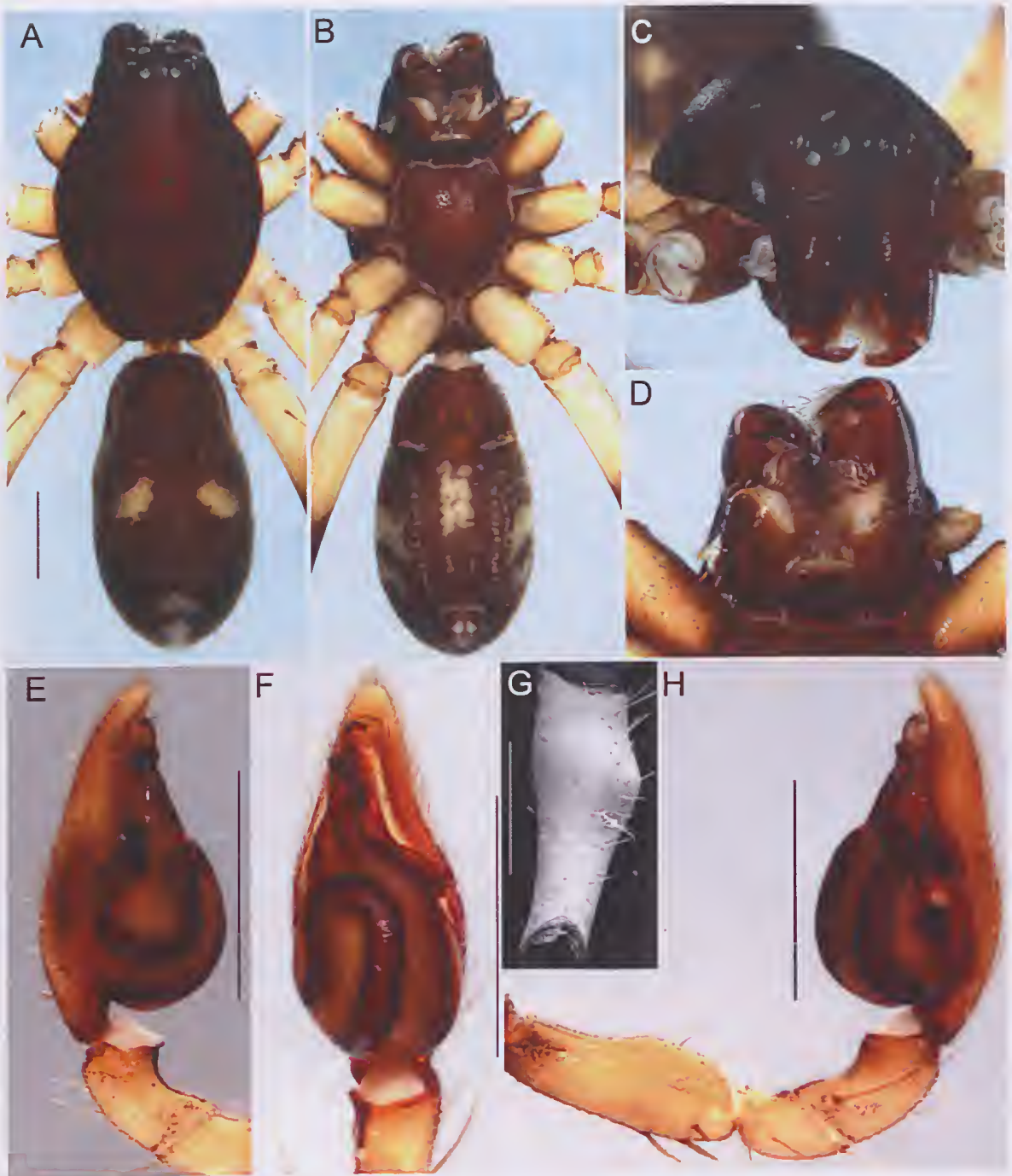


FIG. 6. *Leichhardteus bimaculatus*, male (QM S14709). A, Habitus, dorsal view; B, Same, ventral view; C, Prosoma, frontal view, male; D, Mouthparts, ventral view, male; E, Male palp, prolateral view; F, Same, ventral view; G, Palpal femur, ventral view; H, Same, retrolateral view. Scale 1 mm, femur 0.5 mm.



FIG. 7. *Leichhardteus garretti*, male (QM S68111), female (QM S68110). A, Habitus, dorsal view, male; B, Prosoma, dorsal view, female; C, Opisthosoma, dorsal view, female (QM S55397); D, Habitus, ventral view, male; E, Prosoma, ventral view, female; F, Opisthosoma, ventral view, female (QM S55397); G, Mouthparts, ventral view, female; H, Spinnerets, female (QM S55397) ventral view; I, Male palp, prolateral view; J, Same, ventral view; K, Same, retrolateral view; L, Female epigyne ventral view; M, Female epigyne dorsal view. Scale 1 mm; epigyne, 0.1 mm.

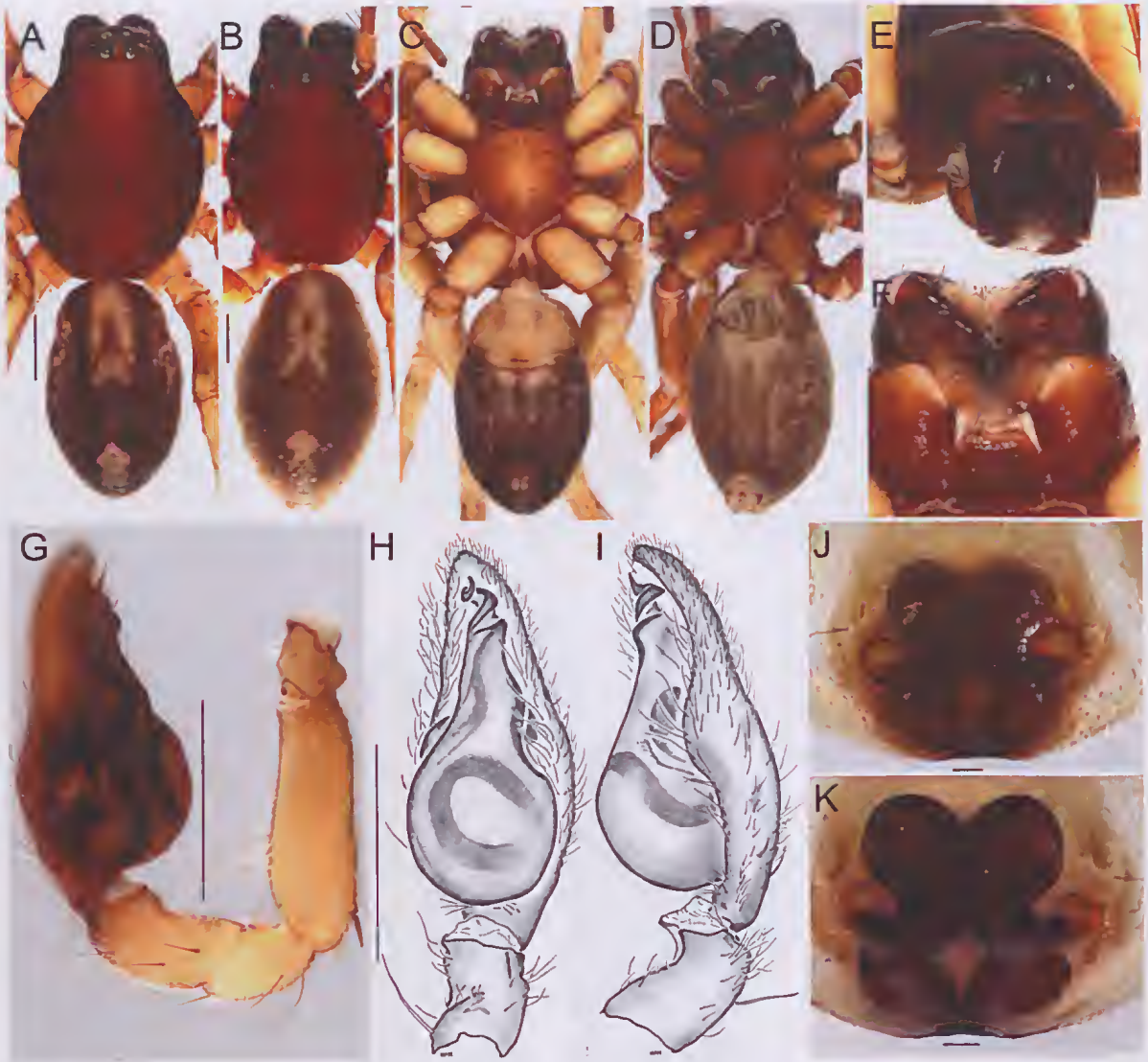


FIG. 8. *Leichhardtia kroombit*, male (QM S92472), female (QM S31542). A, Habitus, dorsal view, male; B, Same, female; C, Habitus, ventral view, male; D, Same, female; E, Prosoma, frontal view, male; F, Mouthparts, ventral view, male; G, Male palp, prolateral view; H, Male palp, ventral view; I, Same, retrolateral view; J, Female epigyne ventral view; K, Female epigyne dorsal view. Scale 1 mm; epigyne, 0.1 mm.



FIG. 9. *Leichhardteus reinhardi* male (QM S92342), female (QM S79286). A, Habitus, dorsal view, male; B, Same, female; C, Habitus, ventral view, male; D, Same, female; E, Prosoma, frontal view, male; F, Mouthparts, ventral view, male; G, Male palp, prolateral view; H, Male palp, ventral view; I, Same, retrolateral view; J, Female epigyne ventral view; K, Female epigyne dorsal view. Scale 1 mm; epigyne, 0.1 mm.



FIG. 10. *Leichhardteus terriirwinae*, male (QM S38609). **A**, Habitus, dorsal view; **B**, Same, ventral view; **C**, Prosoma, frontal view, male. **D**, Mouthparts, ventral view, male; **E**, Male palp, prolateral view. **F**, Same, ventral view; **G**, Same, retrolateral view. Scale 1 mm.

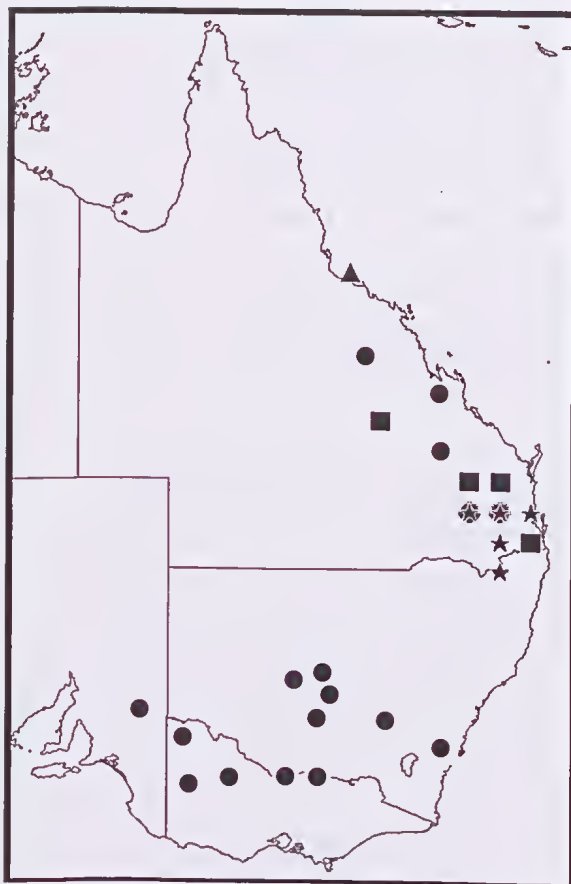


FIG. 11. Distribution of *Leichhardtus*. Circle: *L. conopalpis*. Star: *L. albobfasciatus*. Square: *L. badius*. Triangle: *L. bimaculatus*.

***Leichhardtus conopalpis* sp. nov.**
Baehr & Raven
(Figs 1, 2A, 3A–K, 11)

Etymology. The species epithet is a Latin combination of *conus* and *palpus* meaning palp with conical structure.

Material examined. New South Wales: Male holotype, Taleeban (site 4T), 33°57'S 146°27'E, C. NSW, spinifex, pitfall, 3–8 Nov 1999, D. Driscoll (QM S52729). Female allotype from Gubatta (site 3G), 33°35'S, 146°35'E, pitfall, 6–14 Dec 1999, D. Driscoll, QM (S53920).

Other material. New South Wales: 1♀ 1♂, Barmah forest, 35°56'S 145°03'E, tree trunk, Nov 2001, A. Ballinger (QM S92341); 2♂, Bungonia, 34°52'S 149°57'E Jan 1990, G.S. Hunt (AM KS22748); 1♀ 1♂, Dananbilla Nature Reserve (gen. nov. 1 sp. nov. 1) 34°12'S 148°28'E, D9/10, 11–17 Nov. 2010; 1♀,

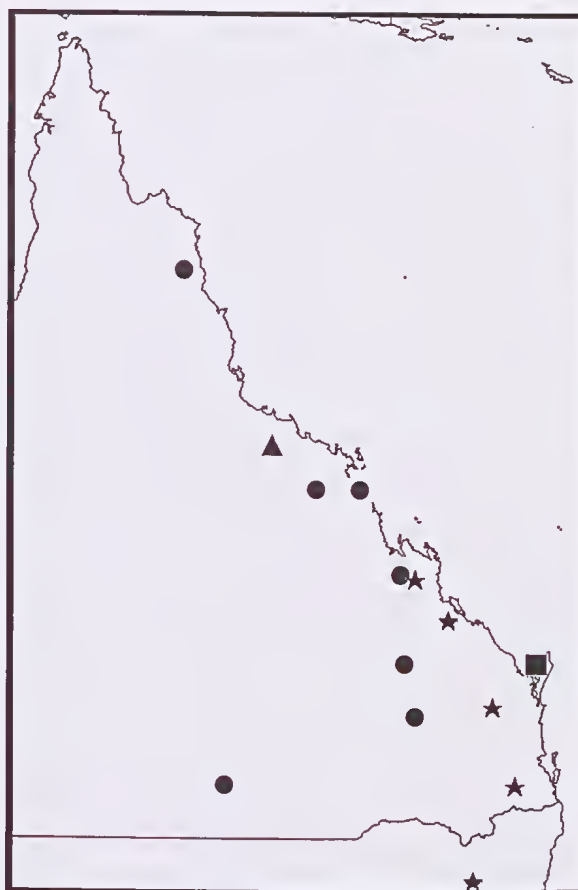


FIG. 12. Distribution of *Leichhardtus*. Circle: *L. garretti*. Star: *L. kroombit*. Square: *L. reinhardi*. Triangle: *L. terriirwiniae*.

Ned's Corner Nature Reserve (gen. nov. sp. nov. 17) 34°12'37.3"S, 141°32'06.7"E, 33 m, chenopod scrubland, 22–29.11.2011, B. Baehr, pitfall (MV); 1♀ 1♂, Gubatta (site 8G), 33°35'S 146°36'E, road verge, pitfall, 12–18 Oct 1999, D. Driscoll (QM S53143); 1♂, Gubatta (site 6G), 33°32'S 146°32'E, spinifex, pitfall, 12–18 Oct 1999, D. Driscoll (QM S52996); 2♀ Gubatta (site 9G), 33°34'S 146°32'E, spinifex, pitfall, 12–18 Oct 1999, D. Driscoll, (QM S53289); 1♂ Gubatta (site 10G), 33°36'S 146°31'E, woodland, pitfall, 12 Oct–18 Dec 1999, D. Driscoll (QM S53265); 1♂, Pulletop (site 9P), 34°01'S 146°04'E, road verge, pitfall, 12–18 Oct 1999, D. Driscoll (QM S52909); 1♂, Round Hill Nature Reserve (site 4R), 32°59'S 146°05'E, mallee, pitfall, 2–8 Nov 1999, D. Driscoll (QM S52882); 1♂ Round Hill Nature Reserve (site 6R), 32°59'S 146°03'E, C. mallee, pitfall, 2–8 Nov 1999, D. Driscoll (QM S52748); 1♂, Round Hill Nature Reserve (site 1R), 33°03'S 146°13'E, mallee, pitfall, 2–8 Nov 1999, D. Driscoll (QM S52843); 1♂ 1♀, Taleeban (site 8T),

33°53'S 146°28'E, road verge, pitfall, 12–18 Oct 1999, D. Driscoll (QM S53223); 1♂, Taleeban (site 8T), 33°53'S 146°28'E, road verge, pitfall, 3–10 Nov 1999, D. Driscoll (QM S53750); 1♂, Taleeban (site 2T), 33°55'S 146°27'E, C. NSW, spinifex, pitfall, 12–18 Oct 1999, D. Driscoll (QM S53714). Queensland: 2♀, Lake Broadwater (Site 1), 27°21'S 151°06'E, pitfall, 3 Jan–25 Feb 1986, M. Bennie (QM S50468); 1♂, same data but, 25 Feb–22 Apr 1986, M. Bennie (QM S52278); 1♂ 1♀, same data but, 16 May–23 Nov 1985 (QM S52279); 1♂ 1♀, same data but, 24 Nov 1985–3 Jan 1986, M. Bennie, (QM S52277); 1♀, same data but, 26 Jan–18 Feb 1985, (QM S50457); 1♂, Boggomoss No 3, adjacent, (BS 55) Taroom, 25°26'S 150°01'E, open forest, pitfall, 12 Jun–9 Sep 1996, P. Lawless (QM S37141); 1♂, Mazeppa National Park, N end, 22°14'S 147°15'E, brigalow, flight intercept trap, 18 Dec 2000–26 Mar 2001, D. Cook, G. Monteith, QM S56139; 1♂, Mazeppa National Park, N end, 22°14'S 147°15'E, brigalow, flight intercept trap, 18 Dec 2000–26 Mar 2001, D. Cook, G. Monteith, QM S56895; 1♂, Mt Deongwar, 3 km S (site 2), 27°14'S 152°15'E, rainforest, flight intercept trap, 14 Oct–30 Dec 1998, G. Monteith D. Cook (QM S50137); 1♀ Pheasant Creek, (Armstrong), Block 2, 6 km N house, 23°45'S 150°09'E, pitfall, 30 Sep 1993, D. Wallace (QM S44103). South Australia: 1♀, Kimba, 16 miles E, 2 Dec 1959, B. Main (WAM T121152); 1♀, (WAM T121154); 1♂, Renmark, 79 km NNW, 33°31'S 140°24'E, chenopod scrubland, 8 Nov–2 Dec 1995, K.R. Pullen (QM S92473); 1♀, Renmark, 32k N, 33°52'S 140°44'E, pitfall & intercept traps, 12 Dec 1995–25 Jan 1996, K.R. Pullen, (QM S39552); 3♂, Renmark, 32k N, 33°52'S 140°44'E, pitfall & intercept traps, 12 Dec 1995–25 Jan 1996, K.R. Pullen, (QM S39552). Victoria: 1♀, Glenrowan, 36°27'S 146°13'E 30 Mar 1993, A. Hall (AM KS35069); 1♀, Nathalia, 9 km SW, 36°06'S 145°07'E, pitfall, 17–22 Jan 1994 G. Milledge, P. Lillywhite (MV K4520); 1♂ 1♀, Yambuna, 36°06'S 145°02'E 3.5 km NE State Forest, pitfall, 27–30 Jan 1995, J. Evans, S. Hinkley, J. Wainer (MV K-6980); 1♀, (MV K-4394); 1♂, Lower Moira, 5 km ESE, 36°05'S 145°03'E, pitfall, 27–30 Jan 1995, J. Evans, S. Hinkley, J. Wainer (MV K-4400); 2♂, (MV K-4401); 1♂, 36°09'S 145°13'E, pitfall, 2–7 Dec 1994, J. Evans, S. Hinkley, M. Griffiths (MV K-4525); 1♂, Kaarimba 5 km ESE 36°10'S 145°14'E 3.5 km, pitfall, 17–22 Jan 1994, G. Milledge (MV K-4532); 1♀, McLellands Rd, 0.1 km N Rathbones Rd, 36°09'S 145°13'E, 26–30 Jan 1995, J. Evans, S. Hinkley, J. Wainer (MV K-4529); 2♂, McDonalds Rd, 1.8km S Shepparton-Barmah Rd, 36°04'S 145°02'E, 2–7 Dec 1994, J. Evans, S. Hinkley, M. Griffiths (MV K-4399); 1♀, (MV K-4398); 1♀, Wychitella, 8.5 km S, mallee site W1, 36°20'S 143°36'E, 15–20 Oct 1989, J. Coventry (MV K-4337).

Diagnosis. Males of *Leichhardtus conopalpis* resemble those of *L. garretti* in having a large conical process (like a conopalpis horn) on the ventral part of the palpal femur but males and

females can easily be distinguished by the yellow orange prosoma with front part of carapace and mouthparts are dark brown and the dark brown Opisthosoma with dorsally wide pale anterior crescent and small ovoid pale arrow-shaped spot in front of the spinnerets.

Description. Male (QMS92473): total length 8.64; prosoma length 3.76; width 2.60.

Colour. Prosoma, mouthparts and legs yellow orange; front part of carapace and mouthparts dark brown; leg IV from tibia darker. Opisthosoma dorsally dark brown with wide pale anterior crescent and small ovoid pale arrow-shaped spot posteriorly; ventrally pale centrally dark brown posteriorly, with brown flanks and 3 light brown fingers running forward from spinnerets. *Prosoma*: ALE separated from edge of carapace by 1.5 of their diameter. *Eyes*: AME: 0.25; ALE: 0.16; PME: 0.16; PLE: 0.21; AME largest; AME separated by less than their radius; AME–ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME separated by 1.5 of their diameter, PLE–PME separated by PME radius (Fig. 3E). Sternum (Fig. 3C) surface punctated. *Opisthosoma*: ovoid (Fig. 3A) with large oval dorsal scute covering 3/4 of abdomen, venter with yellow orange epigastric scute. *Palp*: Femur with conical process about diameter of femur long (Fig. 3I). Cymbium with conical spine-like process; embolus broad with reflexed flattened apex.

Female (QM S53920). Total length 8.21; prosoma length 4.18; width 2.89. *Eyes*: AME: 0.28; ALE: 0.22; PME: 0.15; PLE: 0.17. *Abdomen* with small dorsal scute. *Epigyne* (Fig. 3J, K) about as long as wide, copulatory openings (CO) near lateral margin about halfway between epigastric fold and anterior end of epigyne, epigynal ducts short, semicircular, laterally connected to S-shaped spermathecae, spermathecae anterior part pear-shaped smooth with small lateral glandulae, posterior part with 4–5 diverticulae.

Distribution. *Leichhardtus conopalpis* is the most common species with a wide distribution in eastern Australia, common in chenopod scrubland (Fig. 11).

Leichhardteus albofasciatus sp. nov.

Baehr & Raven.

(Figs 2F, 4A–K, 11)

Etymology. The species epithet is a Latin combination of *albus*, *alba* –um an adjective meaning white and *fasciata* noun meaning stripe, streak, band meaning with white band.

Material examined. Queensland: Male holotype, Mt Tamborine, Curtis Falls, 27°58'S 153°11'E, 23 Jun 1982, H. Parnaby (QM S29577). Female Allotype from Lamington National Park (IBISCA) 700A, (S76352) 28°18'S 153°12'E, rainforest, fungus pitfall, 16–21 Oct 2006, R. Menendez, G. Monteith, (QM S76352).

Other material. New South Wales: 2♀, Beaurie State Forest, 705m 28°32'S 152°20'E, 4 Feb–9 Apr 1993, M. Gray, G. Cassis (AM KS 036162); 1♂, 1♀, Chaelundi State Forest, 3.8 km w along Stockyard fire trail from Chandler 29°57'S 152°31'E, 4 Feb–9 Apr 1993, M. Gray, G. Cassis (AM KS40175). Queensland: 1♂, Lamington National Park, O'Reillys Guest House, 28°14'S 153°08'E, flight intercept trap, 27 Dec 1981–15 Jan 1982, G. Monteith (QM S29489); 2♂, Lamington National Park, O'Reillys, Wishing Tree Circuit, 28°15'S 153°09'E, rainforest, pitfall, 27 Dec 1981–15 Jan 1982, Monteith, Raven, Yeates (QM S29493); 1♂, Lamington National Park, Binna Burra, 28°12'S 153°10'E, pitfall, 23–24 Oct 2003, G. Monteith (QM S62521); 1♂, Mapleton Falls National Park, 26°37'S 152°50'E, rainforest, flight intercept trap, 30 Nov 1991–8 Jan 1992, D.J. Cook (QM S31537); 1♀, Mt Glorious (Hiller HS), 27°20'S 152°46'E, rainforest, malaise trap, 12 Dec 1998–28 Jan 1999, N. Power (QM S91807); 1♀, Mt Glorious, 27°20'S 152°46'E, rainforest, 1 Feb 1973, R. J. Raven (QM S29407); 1♀ 1♂, Mt Mee, 27°03'S 152°41'E, rainforest, intercept flight trap, 29 Nov 1991–8 Jan 1992, D. J. Cook, QM S50412; 1♂, Nichols Scrub, 28°11'S 153°26'E, rainforest, intercept flight trap, 1 Jan 1992–4 Mar 1992, D. J. Cook (QM S39688); 1♀, Redwood Park, Toowoomba, 27°35'S 151°57'E, rainforest, pitfall, 1–23 Dec 1991, G. Monteith, H. Janetzki (QM S50421); 1♂, Toowoomba, Redwood Park, 27°35'S 151°37'E, 350m, pitfall 23 Dec 1991–10 May 1992, H. Janetzki (QM S25194); 2♂ 2♀, Top of Blackbutt Range, 26°52'S 152°11'E, rainforest, flight intercept trap, 24 Nov 1995–3 Feb 1996, G. Monteith (QM S60624).

Diagnosis. Males of *Leichhardteus albofasciatus* resemble those of *L. badius* and *L. reinhardi* in having no conical process but an enlarged palpal femur, fringed with a line of long setae but males and females can be easily distinguished by the dark opisthosoma with a longitudinal pale stripe.

Description. Male (QM S29577): total length 6.31 prosoma length 3.29; width 2.51.

Colour. Prosoma, mouthparts and legs yellow brown. Opisthosoma dorsally dark brown with wide pale dorsomedian stripe; ventrally pale with broad median dark brown stripe. **Prosoma:** ALE separated from edge of carapace by twice their diameter. **Eyes:** AME: 0.20; ALE: 0.17; PME: 0.18; PLE: 0.18; AME largest; AME separated by less than their radius; AME–ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME separated by 1.5 of their diameter, PLE–PME separated by PME radius (Fig. 4A). **Opisthosoma:** ovoid (Fig. 4A) without dorsal scute, venter with thin yellow orange epigastric scute. **Palp** (Figs 4G–I): Femur ventrally bulging fringed with line of long setae, without conical process. Cymbium with conical spine-like process; embolus narrow twisted twice with thin apex.

Female (QM S76352). Total length 9.63; prosoma length 3.84; width 2.87. **Eyes:** AME: 0.24; ALE: 0.21; PME: 0.20; PLE: 0.21. **Epigyne** (Fig. 4J, K) wider than long, copulatory openings (CO) circular, anterior half chitinized, epigynal ducts short, thick, semicircular, spermathecae strongly S-shaped, anterior part pear-shaped smooth with small lateral glandulae, posterior part with about 3 diverticulae.

Remarks. *Leichhardteus albofasciatus* is most likely living together with *Leptomyrmeus tibialis* Emery, 1895 and *Leptomyrmeus cnemidatus* Wheeler, 1915 (Lucky & Ward 2010) which both are found in Lamington National Park rainforest, as the specimen of QM S62521 was collected together with *Leptomyrmeus tibialis* Emery, 1895.

Distribution. *Leichhardteus albofasciatus* is found in rainforests through southern Queensland and northern NSW (Fig. 11).

Leichhardteus badius sp. nov.

Baehr & Raven

(Figs 2H, 5A–K, 11)

Etymology. The specific name *badius* is Latin referring to *badini* an adjective meaning reddish-brown which refers to the body colour and is chosen in honour of Bob Brown, former leader of

the Australian Greens who rescued rainforest environments.

Material examined. Queensland: Male holotype, Bunya Mountains National Park, behind Rice's cabins, 26°53'S 151°35'E, rainforest, malaise trap, 13–17 Jan 1998, C. Lambkin, (QM S31555); female allotype from Bunya Mountains National Park, Dandabah, 26°54'S 151°33'E, sweeping/ beating, 1–7 Mar 1976, V. Davies, L. Chapman, (QM S31545).

Other material. Queensland: 3♂ 2♀, Bunya Mountains National Park, behind Rice's cabins, 26°53'S 151°35'E, rainforest, malaise trap, 13–17 Jan 1998, C. Lambkin (QM S31556); 1♀, 2 Mar – 12 Apr 1992 (QM S92343); 1♂, 1♀, Mt Moffatt National Park, Mahogany Forest, 24°57'S 148°02'E, open forest, intercept flight trap, 26 Sep–26 Nov 1995, G. Monteith (QM S38558); 1♀, Numinbah State Forest, 28°12'S 153°13'E, rainforest, on bark, 22 Nov 1979, T. Robinson (QM S29412); 3♂, 2♀, Saddle Tree Creek, 26°51'S 151°38'E, rainforest, flight intercept trap, 7 Jan – 1 Mar 1992, D. J. Cook (QM S59047); 8♂ 1 Dec 1991 – 7 Jan 1992 (QM S50419); 1♀ The Palms via Cooyar, 26°56'S 151°53'E, rainforest, pitfall, 25 Oct 1975–25 Jan 1976, G. & S. Monteith (QM S29397); 3♂ 2♀, (QM S50417); 1♂, Yarraman, 26°51'S 152°00'E, rainforest, flight intercept trap, 1 Dec 1991–7 Jan 1992, D.J. Cook (QM S50420);

Diagnosis. Males of *Leichhardtus badius* resemble those of *L. albofasciatus* in having no conical process but an enlarged palpal femur but males and females can be easily distinguished by having abdominal scutes and the pale chevrons on the dorsal side of the abdomen.

Description. *Male* (QM S31555): total length 6.19 prosoma length 3.16; width 2.47.

Colour. Prosoma, mouthparts reddish brown, legs yellow brown. Opisthosoma dorsally dark brown with wide pale chevrons covering the whole dorsum; ventrally pale with broad median dark brown band. *Prosoma*: ALE separated from edge of carapace by twice their diameter. *Eyes*: AME: 0.21; ALE: 0.17; PME: 0.16; PLE: 0.17; AME largest; AME separated by less than their radius; AME-ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME separated by 1.33 of their diameter, PLE-PME separated by PME radius (Fig. 5A). *Opisthosoma*: ovoid (Fig. 5A) with long dorsal scute, venter with thin yellow orange epigastric scute. *Palp* (Figs 5G–I): Femur ventrally bulging fringed with line of long setae, without conical process. Cymbium

with conical spine-like process; embolus broad medially, twisted twice with thin apex.

Female (QM S31545). total length 9.11; prosoma length 4.00; width 3.06. *Eyes*: AME: 0.22; ALE: 0.20; PME: 0.21; PLE: 0.20. *Epigyne* (Fig. 5J, K) longer than wide, copulatory openings (CO) circular, $\frac{3}{4}$ of rim chitinated, epigynal ducts stout, semicircular, laterally connected to S-shaped spermathecae, spermathecae anterior part pear-shaped, smooth with small lateral glandulae, posterior part with about 4 diverticulae.

Distribution. *Leichhardtus badius* is common in rainforests through southern Qld (Fig. 11).

Leichhardtus bimaculatus sp. nov.

Baehr & Raven

(Figs 2C, 6A–H, 11)

Etymology. The specific name *L. bimaculatus* is Latin, meaning 2 spots, referring to the two spots on the dorsal side of the opisthosoma.

Material examined. Queensland: Male holotype, Conway National Park, 20°25'S 148°49'E, rainforest, (3 Sep 1988, R. Raven, J. Gallon, T. Churchill, (QM S14709). Paratypes: 1♂ from Mt Cleveland, 500 m, 19°16'S 147°03'E, pitfall traps, Jan–March 1991, A. Graham, (QM S17980).

Diagnosis. Males of *Leichhardtus bimaculatus* resemble those of *L. kroonibit* in having only a slightly bulging femur but males and females can be easily distinguished by having 1 pair of white spots on the dorsum of the abdomen and distinct distal dark stripes on femora II–IV.

Description. *Male* (QM S14709): total length 6.50 prosoma length 3.23; width 2.28.

Cephalothorax. Prosoma, mouthparts blackish brown, legs pale yellow with darker marking on femora and patellae. Opisthosoma dorsally dark brown with 1 pair of white spots at middle and 2 small spots in front of the spinnerets; ventrally dark brown with 1 long white median spot and 2 pairs of lateral ones. *Prosoma*: ALE separated from edge of carapace by 1.5 times their diameter. *Eyes*: AME: 0.20; ALE: 0.14; PME: 0.16; PLE: 0.17; AME largest; AME separated by less than their radius; AME-ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME separated by 1 $\frac{1}{3}$

of their diameter, PLE-PME separated by PME radius (Fig. 6A). *Opisthosoma*: ovoid (Fig. 6A) with long dorsal scute, venter with thin yellow orange epigastric scute. *Palp* (Figs 6 E-H): Femur ventrally slightly bulging, without conical process. Embolus narrow at median part twisted 1 ½ with thin apex.

Female. Unknown

Distribution. *Leichhardteus bimaculatus* is known only from rainforest at Conway Range National Park and Mt Cleveland, in mid-eastern and northern QLD (Fig. 11).

Leichhardteus garretti sp. nov.
Baehr & Raven
(Figs 2B, 7A-M, 12)

Etymology. The specific name *garretti* is in honour of Peter Garrett, former Minister of Environment for his engagement for the study of the Australian environment.

Material examined. Queensland: Male holotype, Wonga Hills, 26°04'S 150°49'E, vine scrub, 480 m, pitfall trap site 1, 11 Dec 2001–4 Mar 2002, G. Monteith, D. Cook, (QM S68111); female allotype, same as holotype, except 500 m, site 2, QM S68110).

Other material. Queensland: 1♀, Mt Gavial, 1 km S, 23°36'S 150°29'E, open forest, pitfall, 17 Dec 1998–14 Mar 1999, D. J. Cook (QM S50054); 1♂, Mt Molloy, 17 km S, 16°49'S 145°22'E, low open woodland, baited pitfall trap, 6–9 Feb 1998, G. Monteith D. Cook, (QM S50888); 1♂, Mt Robert, 2 km NNW, 21°21'S 148°29'E, semi-evergreen vine thicket, flight intercept trap, 19 Dec 2000–25 Mar 2001, D. Cook, G. Monteith, (QM S56904); 1♀, 19 Dec 2000–25 Mar 2001 (QM S55397); 1♂, North East Island, Percy Is, 21°42'S 150°20'E, 30 Oct 1936, C. White (QM S12251); 1♂, Taroom district, Boggomoss 12, Nathan Gorge, 25°27'S 150°08'E, 13 Nov 1996, QLD Museum survey (QM S36940); 1♂ Upper Hall Creek via Carmila, 21°52'S 149°18'E, open forest, pitfall, 4 Dec 1996–6 Apr 1997, G. Monteith, E. Maulder (QM S41729); 1♂, Wonga Hills, 26°04'S 150°49'E, vine scrub, 480 m, pitfall trap site 1, 11 Oct–11 Dec 2001, G. Monteith, D. Cook (QM S60633).

Diagnosis. Males of *Leichhardteus garretti* resemble those of *L. conopalpis* and *L. terriirwiniae* in having palpal femur with ventral conical process but males and females can be easily distinguished by having dark coloured body and legs not annulated.

Description. *Male* (QM S68111): total length 6.27 prosoma length 3.11; width 2.15.

Colour. Prosoma, mouthparts reddish brown, legs yellow brown coxae trochantera and femora dark brown. *Opisthosoma* dorsally dark brown with 3 small spots in front of spinnerets; ventrally dark brown with pale median band. *Prosoma*: ALE separated from edge of carapace by 1.5 times their diameter. *Eyes*: AME: 0.20; ALE: 0.17; PME: 0.13; PLE: 0.16; AME largest; AME separated by less than their radius; AME-ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME separated by 1.5 of their diameter, PLE-PME separated by PME radius (Fig. 7A). *Opisthosoma*: ovoid (Fig. 7A) with long dorsal scute 2/3 of opisthosoma long, venter with orange brown epigastric scute. *Palp* (Figs 7 I-K): Femur ventrally with conical process. Cymbium with conical spine-like process; embolus broad at median part twisted twice with thin apex.

Female (QM S68110). Total length 6.83; prosoma length 4.00; width 2.25. *Eyes*: AME: 0.17; ALE: 0.16; PME: 0.16; PLE: 0.16. *Epigyne* (Fig. 7 L, M). wider than long, copulatory openings (CO) circular, ¾ of rim chitinized with median black dot, epigynal ducts slender, S-shaped, spermathecae slightly S-shaped, anterior part pear-shaped smooth with small lateral glandulae, posterior part with about 4 diverticulae.

Distribution. *Leichhardteus garretti* is found in open forest and vine thickets through coastal northern Queensland (Fig. 12).

Leichhardteus kroombit sp. nov.
Baehr & Raven
(Figs 2D, 8A-K, 12)

Etymology. The specific name is a noun in apposition taken from the type locality.

Material examined. Queensland: Male holotype, Kroombit Tops, Three Moon Creek, 24°21'S 151°00'E, rainforest, 9–19 Dec 1983, V. Davies, J. Gallon, (QM S92472). Female allotype, same as holotype (QM S31542).

Other material. New South Wales: 1♂, Styx River State Forest, 30°33'S 152°20'E, 1080m, 4 Feb–9 Apr 1993, M. Gray, G. Cassis (AM KS035392). Queensland:

1♀, Black Rock Scrub, 28°07'S 152°39'E, rainforest, flight intercept trap, 2 Dec 2000–13 May 2001, G. Monteith (QM S56143); 1♀, Dwyer Creek, Imbil, 26°28'S 152°38'E, hoop pine scrub, flight intercept trap, 24 Sep 2000–15 Jan 2001, G. Monteith (QM S78590); 1♀, Kroombit Tops, northern escarpment, 24°25'S 151°03'E, open forest, 9–19 Dec 1983, V. Davies, J. Gallon (QM S29474); 1♀, Kroombit Tops, Three Moon Creek, 24°21'S 151°00'E, rainforest (23 Feb 1982, G. Monteith, R. Raven, D. Yeates, (QM S29492); 1♀, Little Yabba Creek, 150 m, 26°37'S 152°41'E, rainforest, intercept traps, 7 Jan–2 Mar 1992, D. Cook (QM S91394); 2♂, Kroombit Tops (Site 9), Lower Dry Creek, 24°24'S 151°01'E, rainforest, pitfall, 11–18 Dec 1983, G. Monteith, V. Davies, J. Gallon, G. Thompson (QM S29472); northern escarpment, 24°25'S 151°02'E, open forest 9–19 Dec 1983, V. Davies, J. Gallon (QM S29474); 1♀, Mt Gavial, 3 km SSW, 320 m, 27 Sep 1999, G. Monteith, D. Cook, C. Burwell (QM S79281).

Diagnosis. Males of *Leichhardteus kroombit* resemble those of *L. bimaculatus* in having a relatively slim palpal femur without ventral conical process but males and females can be easily distinguished by having a double X-shaped pale pattern at the front of their dark abdomen.

Description. *Male* (QM S92472): total length 7.38; prosoma length 3.95; width 2.76.

Colour. Prosoma, mouthparts reddish brown, legs yellow brown femora slightly darker. Opisthosoma dorsally dark brown with double X-shaped pale pattern at the front and 3 small spots in front of spinnerets (Fig. 8A); ventrally dark brown with pale area in front of epigastric area. *Prosoma*: ALE separated from edge of carapace by twice their diameter. *Eyes*: AME: 0.28; ALE: 0.22; PME: 0.25; PLE: 0.24; AME largest; AME separated by less than their radius; AME–ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME separated by their diameter, PLE–PME separated by 2/3 of PME diameter (Fig. 8A). *Opisthosoma*: ovoid (Fig. 8A) with long dorsal scute 3/4 of Opisthosoma long, venter with orange epigastric scute. *Palp* (Figs 8G–I): Femur ventrally only slightly bulging, without conical process. Cymbium with retrobasal conical spine-like process; embolus broad at median part twisted twice with thin apex directed distally.

Female (QM S31542). Total length 9.71; prosoma length 4.62; width 3.43. *Eyes*: AME: 0.28; ALE: 0.22; PME: 0.26; PLE: 0.24. *Epigyne* (Fig. 8J,K) about as long as wide, copulatory openings (CO) circular, complete rim chitinated, epigynal ducts short, stout, semicircular, spermathecae S-shaped, posterior part with 5 diverticulae.

Distribution. *Leichhardteus kroombit* is known from rainforest and open forest at Kroombit Tops, SE Qld, to the Styx River in northern New South Wales (Fig. 12).

Leichhardteus reinhardi sp. nov.

Baehr & Raven
(Figs 2G, 9A–K, 12)

Etymology. The specific name *L. reinhardi* is chosen in honour of Reinhard Flessner, University of Queensland's Manager of Collaboration and Research in Europe, for his immense engagement for Leichhardt and the Australian environment.

Material examined. Queensland: Male holotype, from Fraser Island, Orchid beach, 25°25'S 153°16'E, 11–14 Feb 2000, B. Baehr, R. Raven, (QM S92342). Female allotype same as holotype deposited in QM (S79286).

Diagnosis. Males of *Leichhardteus reinhardi* resemble those of *L. albofasciatus* in having a swollen ventral part of the palpal femur, fringed with a line of long setae but can be easily distinguished by the dark opisthosoma without a pale median stripe.

Description. *Male* (QM S92342): total length 6.09; prosoma length 2.97; width 2.01.

Colour. Prosoma yellow orange, front and mouthparts dark brown, legs yellow brown tibia and metatarsus IV distally darker. Opisthosoma dorsally completely dark brown (Fig. 9A); ventrally dark brown, pale in front of epigastric area. *Prosoma*: ALE separated from edge of carapace by 1.5 times their diameter. *Eyes*: AME: 0.28; ALE: 0.22; PME: 0.25; PLE: 0.24; AME largest; AME separated by less than their radius; AME–ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME separated by their diameter, PLE–PME separated by 2/3 of PME diameter (Fig. 9A). *Opisthosoma*: ovoid (Fig. 8A) with long dorsal scute 3/4 of Opisthosoma long,

venter with orange epigastric scute. *Palp* (Figs 8G–I): Femur ventrally bulging, fringed with a line of long setae, but without conical process. Cymbium with retrobasal conical spine-like process; embolus broad at median part twisted twice with thin apex directed distally.

Female (QM S79286). Total length 9.71; prosoma length 4.62; width 3.43. *Eyes*: AME: 0.20; ALE: 0.12; PME: 0.13; PLE: 0.13. *Epigyne* (Fig. 9J, K) about as long as wide, copulatory openings (CO) circular, apical 1/2 of rim chitinized hood-shaped, epigynal ducts short, stout, semicircular, spermathecae anterior part pear-shaped smooth with small lateral glandulae, posterior part with about 6 diverticulae.

Distribution. *Leichhardtus reinhardi* is known only from Fraser Island, SE Qld (Fig. 12).

Leichhardtus terriirwinae sp. nov.
Baehr & Raven
(Figs 2E, 10A–G, 12)

Etymology. The species is named in honour of Terri Irwin, one of the most courageous women supporting Australia's wildlife.

Material examined. Queensland: Male holotype, from Mt Aberdeen, north summit, rainforest, 850 m, 20°12'S, 147°55'E, 5–7 Dec 1996, G. Monteith, D. Cook, (QM S38609).

Diagnosis. Males of *Leichhardtus terriirwinae* resemble those of *L. garretti* in lacking a dorsal scute and having ventral part of the palpal femur with conical process and but can be easily distinguished by their annulated legs and the slim embolus.

Description. *Male* (QM S38609): total length 6.55; prosoma length 3.51; width 2.42.

Cephalothorax. Prosoma and mouthparts dark brown, legs white, femora and distally dark brown. Opisthosoma dark brown with large pale fork-shaped patch at front and 3 combined spots in front of the spinnerets (Fig. 10A); venter dark brown with 3 longitudinal white stripes. *Prosoma*: ALE separated from edge of carapace by twice their diameter. *Eyes*: AME: 0.18; ALE: 0.16; PME: 0.14; PLE: 0.11; AME largest; AME separated by less than their

radius; AME–ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME separated by their diameter, PLE–PME separated by 3/4 of PME diameter (Fig. 10A, C). *Opisthosoma*: ovoid (Fig. 10A) without scute, venter with thin orange epigastric scute. *Palp* (Fig. 10 G–I): Femur ventrally with conical process. Cymbium with retrobasal conical spine-like process; embolus slim at median part twisted twice with thin apex directed distally.

Female. Unknown.

Distribution. *Leichhardtus terriirwinae* is known only from Mt Aberdeen, NE Qld (Fig. 12).

ACKNOWLEDGEMENTS

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Two new species of the goblin spider genus *Cavisternum* from tropical Australia (Araneae: Oonopidae)

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ABSTRACT

Two new species of the Australian endemic goblin spider genus *Cavisternum* are described from the Wongalara Wildlife Sanctuary located in the Northern Territory, Australia. *Cavisternum gillespieae* was found in a gully dominated by rainforest vegetation, and *C. leichhardti* occurred in open woodland environments □ *tropical, goblin spider, new species.*

The goblin spider genus *Cavisternum* Baehr, Harvey and Smith, 2010 was recently described for 19 species of small spiders found throughout tropical northern Australia including three species from Western Australia, four species from the Northern Territory and 12 species from Queensland (Baehr *et al.* 2010). Since then, three additional species from Queensland and Northern Territory have been collected and described (Baehr & Harvey 2010; Baehr *et al.* 2013). Males of this genus are unique amongst goblin spiders by the presence of a sternal depression which is covered with clavate setae, and the elongate fangs with a broadened tip (Baehr *et al.* 2010). Many species have small distributions, and most are only known from one or two locations. The only exceptions to this are *C. clavatum* Baehr, Harvey and Smith, 2010 from the Pilbara region of Western Australia, and *C. ewani* Baehr, Harvey and Smith, 2010 from drier regions of eastern Queensland where it mostly occurs west of the Great Dividing Range.

The purpose of this paper is to describe two new species recently collected from the Northern Territory, bringing the total number of named species of *Cavisternum* to 24, and the number of species recorded from the Northern Territory to seven.

MATERIAL AND METHODS

The specimens examined for this study are lodged in the Museum and Art Gallery of the Northern Territory, Darwin (MAGNT), the Queensland Museum, Brisbane (QM), and the Western Australian Museum, Perth, Australia (WAM). The specimens were examined using a Leica MZ16A microscope. Photomicrographic images were produced using a Leica DFC 500 and the software program AutoMontage Pro Version 5.2 (p). Specimens prepared for scanning electron microscopy were dehydrated in 100% ethanol; sputter coated, and imaged with a Hitachi TM-1000 table top SEM, or a

Zeiss Evo LS15 SEM incorporating a Robinson backscatter detector.

Descriptions were generated with the aid of the Planetary Biodiversity Inventory (PBI) descriptive goblin spider database and shortened where possible. Drawings are done from left palp. Characters and measurements are explained in Figs. 2 and 3. All measurements are in millimeters. Abbreviations are used in the text as follows: ALE, anterior lateral eyes; PLE, posterior lateral eyes; PME, posterior median eyes. Full colour, high-resolution versions of the images will be available on the goblin spider PBI website, at <http://research.amnh.org/oonopidae>.

SYSTEMATICS

Family Oonopidae Simon, 1890

Subfamily Oonopinae Simon, 1890

Cavisternum Baehr, Harvey & Smith, 2010

Cavisternum Baehr, Harvey and Smith, 2010: 4 (type species by original designation *Cavisternum clavatum* Baehr, Harvey & Smith, 2010).

Cavisternum gillespieae, sp. nov.

(Figs. 1 A–J, 2 A–F)

Etymology. This species is named for Kate Gillespie in recognition of her outstanding skills in organising Bush Blitz expeditions and for her enthusiastic collecting of litter-dwelling arachnids at Wongalara.

Material examined. Holotype ♂: **AUSTRALIA: Northern Territory:** Wongalara Wildlife Sanctuary, 14°16'03"S, 134°37'38"E, 3 June 2012, from leaf litter, rainforest gully, M.S. Harvey, K. Gillespie (MAGNT, PBI_OON 00023654). Paratypes: **AUSTRALIA: Northern Territory:** allotype ♀, collected with holotype (MAGNT, PBI_OON 00023655); 1 ♂, 2 ♀, collected with holotype (WAM T125972, PBI_OON 00023656).

Diagnosis. Males of *Cavisternum gillespieae* most closely resemble *C. mayorum* Baehr, Harvey and Smith, 2010 in having a strongly protruding epigastric region (Fig. 1E) and the setal field of the sternum covering $\frac{3}{4}$ or more of the sternum (Fig. 1B). However, the palp of *C. gillespieae* (Fig. 1 H–J) lacks the long, elongate embolus of *C. mayorum*. Females differ from *C. mayorum*

by copulatory duct short not reaching beyond tracheal groove (Fig. 2 F).

Description. *Male (holotype)* (Fig. 1 A–J). Total length 0.96. Prosoma, mouthparts, abdominal scutae and palpal patella pale orange, legs pale yellow; pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface smooth, lateral margin rebordered, without denticles. Eyes six, well developed, ALE: 0.045; PME: 0.047; PLE: 0.040, PME largest, ALE circular, PME oval, PLE circular; posterior eye row recurved; ALE separated by their radius to diameter, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum longer than wide, median concavity present, occupying most of the sternum length, without radial furrows between coxae I–II, II–III, III–IV, surface smooth, lateral margin with infra-coxal grooves and anterior pores, distance between coxae approximately equal, with oval field of clavate setae, covering about $\frac{3}{4}$ of sternum. Chelicerae straight, anterior face unmodified, without teeth on both promargin and retromargin, fang flattened directed posteriorly, laterally with broadened tip. Labium triangular, fused to sternum, anterior margin indented at middle. Endites distally not excavated, serrula present in single row, anteromedian tip with one strong, tooth-like projection. *Abdomen:* ovoid, without long posterior extension, rounded posteriorly. Book lung covers small, elliptical. Posterior spiracles connected by groove. Pedicel tube short, ribbed, scuto-pedicel region unmodified, scutum not extending far dorsal of pedicel. Dorsal scutum weakly sclerotized, covering full length of abdomen, no soft tissue visible from above, surface smooth. Epigastric scutum weakly sclerotized, surrounding pedicel, strongly protruding. Postepigastric scutum weakly sclerotized, long, semicircular, covering nearly full length of abdominal length, fused to epigastric scutum, with short posteriorly directed lateral apodemes. Spinneret scutum with fringe of stout setae. Colulus represented only by setae. *Genitalia:* Epigastric region with sperm pore small, oval, situated in front of anterior spiracles, rebordered. Palp normal size, not strongly sclerotized, trochanter normal size, unmodified;

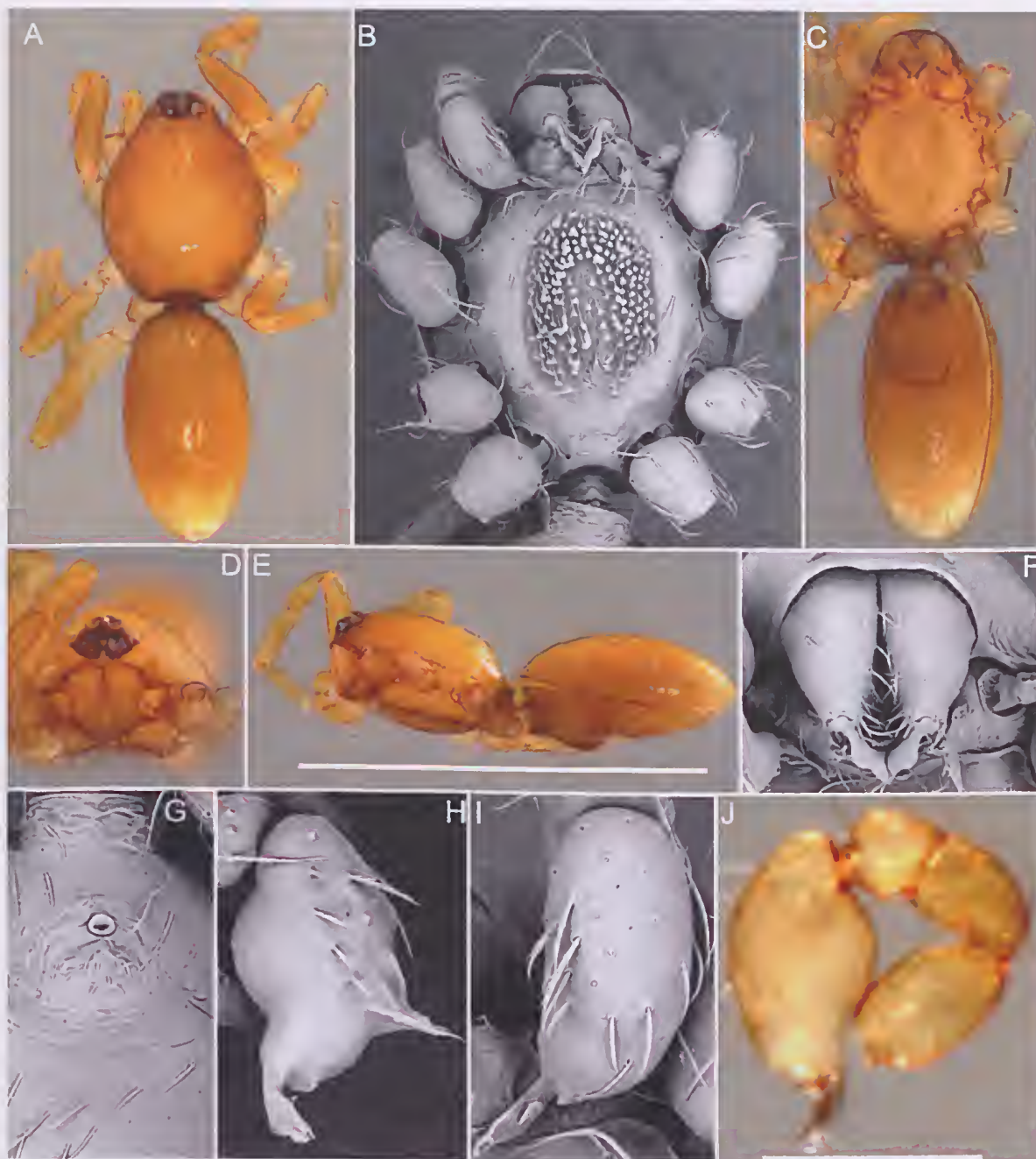


FIG. 1. *Cavisternum gillespieae* sp. nov., male (holotype, PBI_OON 00023654 photographs; SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, habitus, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, mouthparts, anterior view; G, genital region, ventral view; H, male palp, prolateral view; I, same, dorsal view; J, same, retrolateral view.



FIG. 2. *Cavisternum gillespieae* sp. nov., female (allotype PBI_OON 00023655): A, habitus, dorsal view; B, prosoma, ventral view; C, abdomen, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, female epigyne, ventral view. Scale bars = 1.0 mm (Fig. 4E), 0.1 mm (Fig. 4F).

femur normal size, two or more times as long as trochanter, without posteriorly rounded lateral dilation, attaching to patella basally; patella shorter than femur; cymbium, ovoid in dorsal view, fused with bulb but with clearly defined seam between, not extending beyond distal tip of bulb, covered with plumose setae; bulb pear-shaped, bearing a long thin medially bent, embolus with retrolateral tooth-like projection.

Female (allotype) (Fig. 2 A - F). Total length 1.10. As in male except as noted. Eyes ALE: 0.043; PME: 0.039; PLE: 0.032, ALE largest. Sternum median concavity absent. Mouthparts: fangs directed medially, tip unmodified. Endites antemedian tip unmodified. Female palp claws

absent; spines absent. **Abdomen:** cylindrical. Epigastric scutum not protruding. Postepigastric scutum not fused to epigastric scutum. **Genitalia:** Ventral view: epigastric area widely oval, with dark circular copulatory opening at level close to anterior spiracles. Narrow copulatory duct originating from copulatory opening ending at epigastric fold, not reaching beyond tracheal groove.

Remarks. *Cavisternum gillespieae* was collected from leaf litter in an east-facing gully dominated by rainforest vegetation on Wongalara Wildlife Sanctuary.

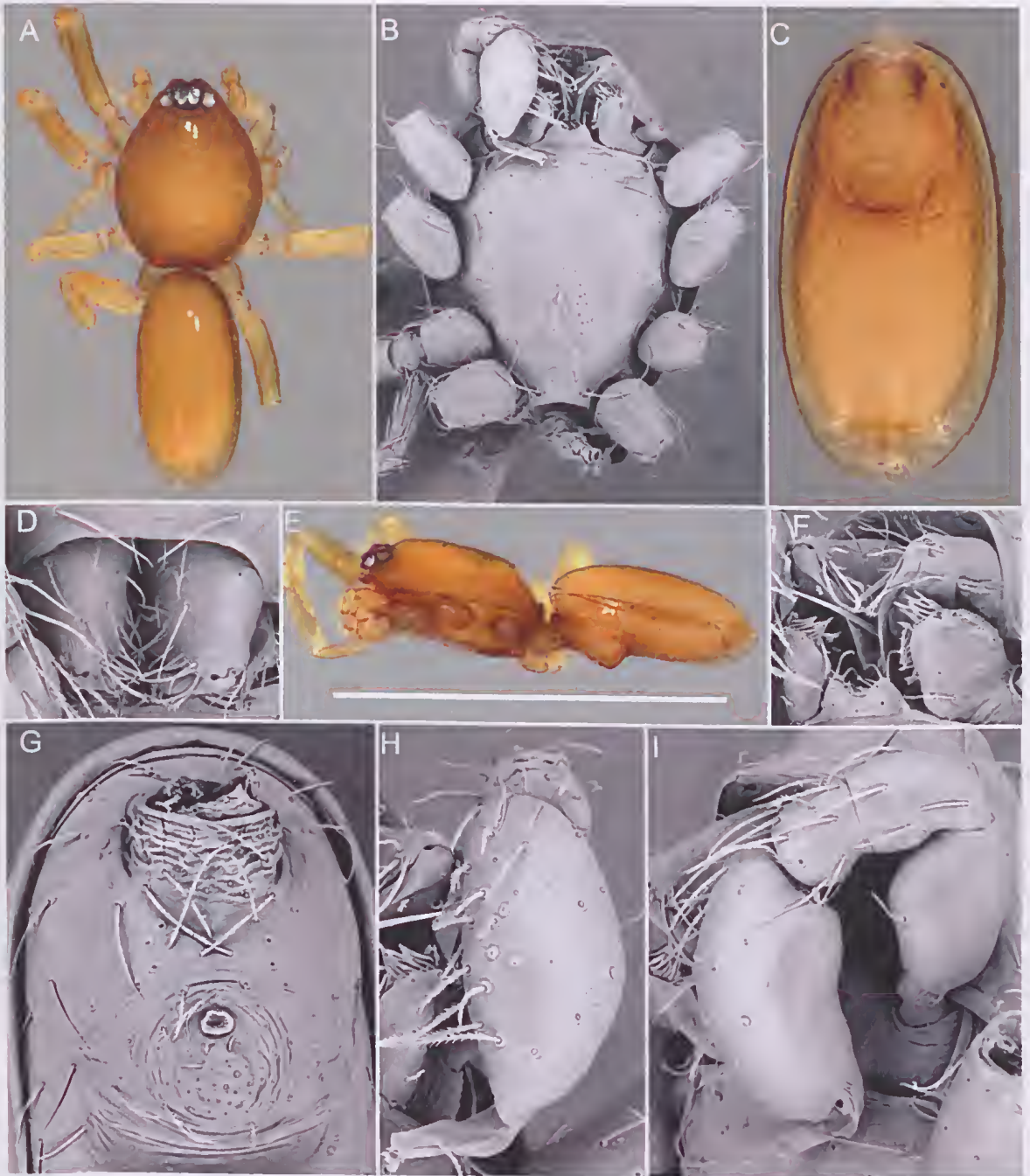


FIG. 3. *Cavisternum leichhardti* sp. nov., male (holotype, PBI_OON 00023702 photographs; PBI_OON 00023704SEM): A, habitus, dorsal view; B, prosoma, ventral view; C, opisthosoma, ventral view; D, mouthparts, anterior view; E, habitus, lateral view; F, mouthparts, ventral view; G, abdomen genital region, ventral view; H, male palp, dorsal view; I, same, retrolateral view.



FIG. 4. *Cavisternum leichhardti* sp. nov., female (allotype PBI_OON 00023703): A, habitus, dorsal view; B, prosoma, anterior view; C, prosoma, posterior view; D, abdomen, ventral view; E, habitus, lateral view; F, female epigyne, ventral view; G, female epigyne, dorsal view. Scale bars = 1.0 mm (Fig. 2E), 0.1 mm (Fig. 2F).

Cavisternum leichhardti, sp. nov.
(Figs. 3 A–I, 4 A–G)

Etymology. This species is named for Prussian explorer and naturalist Friedrich Wilhelm Ludwig Leichhardt (1813–ca.1848), who explored parts of northern Australia before his disappearance while attempting to travel from Brisbane to the Swan River Colony.

Material examined. Holotype ♂: AUSTRALIA: *Northern Territory*: Wongalara Wildlife Sanctuary, 14°08'18"S, 134°09'39"E, 211 m, 1–6 June 2012, wet pitfall traps, M. Harvey, R. Raven, B. Baehr (MAGNT, PBI_OON 00023702). Paratypes: allotype ♀: AUSTRALIA: *Northern Territory*: collected with holotype (MAGNT, PBI_OON 00023703); 3 ♂, collected with holotype (MAGNT, PBI 23704); 1 ♂, collected with holotype (QM S95158, PBI_OON 00023705); 1 ♂, collected with holotype (WAM T121155, PBI_OON 00023706).

Diagnosis. Males of *Cavisternum leichhardti* most closely resemble *C. maxmoormanni* Baehr, Harvey and Smith, 2010 in having a strongly protruding epigastric region (Fig. 3E) and the setal field of the sternum covering about $\frac{1}{4}$ of the sternum (Fig. 3B). The fangs of *C. leichhardti* are much longer than those of *C. maxmoormanni* reaching beyond the labium (Fig. 3E) and the long thin medially bent embolus has a prolaterally serrated margin (Fig. 3H, I). Females resemble those of *C. heywoodi* in having the epigastric area large U-shaped field reaching beyond tracheal groove but differs by and narrower U-shaped field not reaching the lateral apodemes.

Description. *Male (holotype)* (Fig. 3 A, I). Total length 1.02. Prosoma, mouthparts, abdominal scutae and palpal patella pale orange, legs pale yellow; pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface smooth; lateral margin rebordered, without denticles. Eyes six, well developed, ALE: 0.056; PME: 0.066; PLE: 0.048, PME largest, ALE circular, PME oval, PLE circular; posterior eye row recurved from above; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, median concavity a small concave pit with oval field of clavate setae in posterior half of sternum, without radial furrows between coxae I-II, II-III, III-IV, surface smooth, lateral margin with infra-coxal grooves and anterior pores. Chelicerae straight, without teeth on both promargin and retromargin, anterior face unmodified, fang laterally flattened with widened tip. Labium rectangular, fused to sternum, anterior margin indented at middle, with 5 setae on anterior margin. Endites distally not excavated, serrula present in single row, anteromedian tip with stout projection. *Abdomen* ovoid, without long posterior extension, rounded posteriorly. Book lung covers large, ovoid. Posterior spiracles connected by groove. Pedicel tube short, ribbed, scuto-pedicel region unmodified, scutum not extending far dorsal of pedicel. Dorsal scutum weakly sclerotized, covering full length of abdomen, no soft tissue visible from

above, not fused to epigastric scutum, surface smooth. Epigastric scutum weakly sclerotized, surrounding pedicel, strongly protruding. Post-epigastric scutum weakly sclerotized, long, almost rectangular, covering nearly full length of abdominal length, fused to epigastric scutum, with short posteriorly directed lateral apodemes. Spinneret scutum present, incomplete ring. *Legs* patella plus tibia I shorter than carapace. *Genitalia:* Epigastric region with sperm pore small, narrow, slit-like, situated in front of anterior spiracles, rebordered. Palpal trochanter normal size, unmodified; femur enlarged, two or more times as long as trochanter, attaching to patella basally; patella shorter than femur, not enlarged, cymbium completely fused with bulb, no seam visible, bulb pear-shaped, bearing a long thin medially bent, embolus with prolaterally serrated margin.

Female (allotype) (Fig. 4 A - G). Total length 1.15. As in male except as noted. Eyes ALE: 0.056; PME: 0.048; PLE: 0.043, ALE largest. Sternum median concavity absent. Mouthparts fangs directed medially, tip unmodified. Endites anteromedian tip unmodified. Female palp claws absent. *Genitalia:* Ventral view: epigastric area widely oval, with dark T-shaped copulatory opening at level close to anterior spiracles; broad copulatory duct originating from copulatory opening reaching behind at epigastric fold like a broadly U-shaped tongue.

Remarks. This species has only been collected at an open woodland site situated at Wongalara Wildlife Sanctuary.

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A new genus, *Denhamiana* gen. nov., and two new species of land snail from inland central Queensland (Eupulmonata, Camaenidae)

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ABSTRACT

Denhamiana gen. nov. is established for at least two new species of camaenid land snail from inland mid-eastern Queensland. *D. laetifica* sp. nov. occurs in an area stretching from just west of Eungella, southward through the Denham Range to Pine Mountain, south-east of Nebo, while *D. leichhardti* sp. nov. is hitherto known only from the more westerly Carborough Range. A third species ?*Denhamiana* sp. nov. 'Dipperu' is proposed awaiting more specimens. These camaenids are characterised by a combination of morphological features including a large helicoid shell with bold dark brown spiral bands and dark brown apertural lip, a closed umbilicus and a reproductive system featuring a reduced epiphallus, a short vestigial epiphallic flagellum and a cylindrical, sheathed penis that internally has a penial stimulator and triangular verge. Molecular study of one of the species indicates that the genus is a sister group to *Bentosites* Iredale, 1933 whose species occur in coastal and sub-coastal rainforests in localities between Ayr and Sarina, mid-eastern Queensland. □ *Denhamiana* gen. nov., Eupulmonata, Camaenidae, systematics, new species, Queensland, Australia.

The Camaenidae is one of the most speciose groups of land snails in Australia. The family is common in many parts of the continent apart from the south-west and has radiated prolifically in the rainforests of eastern Australia (Smith 1992; Solem 1998; Stanisic *et al.* 2010). Of particular note are the many large helicoid species (historically referred to as the hadroid radiation) that occur in this part of the continent particularly in the region between Bowen and Sarina in mid-eastern Queensland. Sixteen species of large banded camaenids are currently known from the region: *Bentosites* (5 species), *Marilynessa* (5 species), *Temporena* (3 species) and *Sphaerospira* (3 species) (Stanisic *et al.* 2010). However, all of these species occur chiefly in the wetter rainforests and drier vine forests and thickets of the coastal plain and ranges of the region, including some off-lying islands. *Denhamiana* gen. nov. represents the

first record of large, banded, helicoid snails from the inland vine thickets of sub-coastal central Queensland.

MATERIALS AND METHODS

Material used in this study is held in the collections of the Queensland Museum (QMMO). Studies of shell characters were carried out on specimens in the museum's dry collection (RC) and anatomical studies were based on ethanol preserved samples (SC). Measurements of shell characters (height, diameter) were made using callipers with a precision of 0.01 mm. Whorl counts were made to the nearest 1/8 whorl. At least three representatives of each species from their respective type localities were dissected and studied using a WILD M5 stereo microscope with drawing apparatus in order

to confirm stability of reproductive structures. Classification follows Stanisic *et al.* (2010).

ABBREVIATIONS

Anatomy: BC, bursa copulatrix; DG, prostate; E, epiphallus; EC, epiphallic caecum; EP, epiphallic pore; GD, hermaphroditic duct; GG, albumen gland; GT, talon; P, penis; PP, penial pilaster; PRM, penial retractor muscle; PS, penial sheath; PSS, penial stimulator; PV, penial verge; UT, uterus; UV, free oviduct; V, vagina; VD, vas deferens; X, carrefour; Y, atrium.

General: Ck, creek; MEQ, mid-eastern Queensland; Mt, Mount; Mtn, mountain; mvf, microphyll vine forest; NP, National Park; Ra, range; Rd, road; rf, rainforest; sevt, semi-evergreen vine thicket.

SYSTEMATICS

Order EUPULMONATA

Superfamily HELICOIDEA

Family CAMAENIDAE

Genus *Denhamiana* gen. nov.

Type species. *Denhamiana laetifica* sp. nov., herein designated

Etymology. Named for the Denham Range.

Description. Shell large, globosely helicoid, yellowish-brown with prominent sub-sutural and supra-peripheral, dark brown bands and several narrower brown spiral bands on upper part of whorls, and one to several narrow brown spiral bands basally; latter part of body whorl with dark brown suffusion becoming more dense behind aperture and extending onto umbilical area; parietal callus shiny, suffused with brown; lip dark brown. Umbilicus closed. Reproductive system with reduced epiphallus, a tiny vestigial epiphallic flagellum and a cylindrical, sheathed penis that internally has a tongue-like penial stimulator and conical verge with the epiphallic pore situated at the base of the verge. Head wart present.

Distribution and habitat. From west of Eungella at Lake Eungella south through the

Denham Range to Dipperu NP, and west to the Carborough Range, mid-eastern Queensland; living in vine thickets on volcanically derived rocks.

Additional collecting in the Kerlong Range, located adjacent and south-west of the Carborough Range, may yet extend the distribution of the genus.

Remarks. *Denhamiana* gen. nov. exhibits a number of features that readily distinguish it from the other so-called hadroid genera of camaenids in eastern Australia. The large shell, striking shell colour of bold, dark brown spiral bands and dark brown suffusion behind the aperture on a yellowish brown background coupled with the unusual penial anatomy are a combination of characters not seen in any other eastern hadroid genus. In particular the development of a penial stimulator is unique among the large banded eastern Australian camaenids in which there is usually a reduced verge that is short and knob-like and occasionally a main central pilaster, but no stimulator. (Solem 1992; Stanisic unpub.).

Denhamiana laetifica sp. nov. (Figs 1, 2; Table 1)

Etymology. From the Latin *laetifica* = delightful; a name chosen by Matthew Limbert, a student of Samford State School, Queensland and winner of a 'name the snail' competition.

Preferred common name. Denham Range Banded Snail.

Material examined. Holotype: QMMO68577, Denham Ra., c.2 km NNW Mt Robert, MEQ, (21°21'27"S, 148°28'59"E), vine thicket, S. Wright, 23.x.2000. Height of shell 30.53 mm; diameter 34.57 mm; H/D ratio 0.88.

Paratypes: All MEQ. QMMO36102, 7SC/62RC, Eungella Dam, c.2 km SSW, Eungella Dam - Mt Hillalong Rd, (21°10'S, 148°23'E), sevt, under rocks, J. Stanisic, D. & N. Potter, 21.v.1990; QMMO36234, 16SC/32RC, Dipperu NP, scrub S of Pine Mtn, Sarina - Clermont Rd, (21°46'30"S, 148°50'30"E), vine thicket, in logs and hollow trees, J. Stanisic, D. & N. Potter, 22.v.1990; QMMO54313, 10SC/19RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°44'45"S, 148°50'35"E), sevt/Araucaria/volcanics, under rocks and logs, J. Stanisic, D. Potter, G. Ingram, C. Eddie, 23.vii.1994.

Other material. QMMO28519, 1RC, Eungella Dam, c.2 km SSW, Eungella Dam - Mt Hillalong Rd, (21°10'S, 148°23'E), sevt, under rocks, J. Stanisic, D. & N. Potter, 21.v.1990; QMMO35795, 2SC/6RC, Endeavour Ck, Upp Reaches, Clarke Ra, W of Mackay, (21°15'30"S, 148°37'30"E), riverine rainforest, under bark on logs, J. Stanisic, D. & N. Potter, 20.v.1990; QMMO35825, 4RC, Eungella, c.13.5 km SSE, Hazelwood Gorge, (21°14'30"S, 148°26'30"E), vine thicket, under rock, V. Kessner, 20.iii.1992; QMMO36097, 1RC, Eungella Dam, c.1.5 km E, on road to Eungella, W Mackay, (21°10'00"S, 148°23'30"E), rocky outcrop/Ficus, under rocks, J. Stanisic, D. & N. Potter, 21.v.1990; QMMO36230, 2RC, Denham Ra, Homevale - Mt Britton Rd, c.100 km SW Mackay, (21°26'S, 148°35'E), sevt, under rocks, J. Stanisic, D. & N. Potter, 21.v.1990; QMMO36238, 1RC, Sarina, SW at Beautrel Ck, Old Sarina - Marlborough Rd, (22°03'S, 148°59'E), remnant thicket, in logs, J. Stanisic, D. & N. Potter, 22.v.1990; QMMO59242, 7RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°45'00"S, 148°50'23"E), sevt/basalt, J. Stanisic, G. Ingram, 13.vii.1995; QMMO59382, 1RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°44'45"S, 148°50'35"E), sevt/Araucaria/volcanics, under rocks and logs, J. Stanisic, D. Potter, G. Ingram, C. Eddie, 23.vii.1994; QMMO61415, 5SC/5RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°44'45"S, 148°50'35"E), 630m, P. Couper, C. Hoskin, 24.iv.1998; QMMO64903, 1RC, Eungella Dam, W, (21°06'46"S, 148°18'13"E), remnant vine thicket, litter, J. Stanisic, 30.x.1998; QMMO66631, 1RC, Nebo, WNW in Denham Ra., (21°23'04"S, 148°20'31"E), softwood scrub, T. Kitchener, 15.xii.1999; QMMO69882, 1SC, Nebo, NW in Denham Ra, Mt Robert, (21°21'S, 148°29'00"E), 360 m, G. Monteith, D. Cook, 26.iii.2001; QMMO74652, 5RC, Mt Gotthardt Ra, c.5.5k NNE of Mt Cristoe, (21°23'38"S, 148°20'05"E), vine thicket, 400 m, under rocks and in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO74756, 4RC, Mt Gotthardt Ra., c.4.8k N of Mt Cristoe, (21°24'11"S, 148°19'04"E), vine thicket, 360 m, under logs in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO74757, 2RC, Mt Gotthardt Ra., c.5.8k NNE of Mt Cristoe, (21°23'45"S, 148°19'53"E), vine thicket, 400 m, under

logs in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO74764, 1RC, Denham Ra., c.2k NNW of Mt Robert, (21°21'44"S, 148°29'08"E), 360 m, A. Pollock, W. McDonald, 30.vi.2004; QMMO74789, 2RC juveniles, Mt Gotthardt Ra., c.4.8k N of Mt Cristoe, (21°24'11"S, 148°19'04"E), 360 m, under logs in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO76080, 1SC, Denham Ra, c.2k NNW of Mt Robert, (21°21'S, 148°29'E), 60 m, G. Monteith, D. Cook, 18.xii.2000.

Diagnosis. Shell large, yellowish-brown with prominent sub-sutural and supra-peripheral, dark brown bands and several narrower brown spiral bands on upper part of whorls, and one to several narrow brown spiral bands basally; latter part of body whorl with very prominent, dark brown suffusion behind aperture, extending onto umbilical area; parietal callus shiny, strongly suffused with brown; lip dark brown. Umbilicus closed. Reproductive system with reduced epiphallus, tiny vestigial epiphallic flagellum and a cylindrical, sheathed penis with short penial stimulator and conical verge; epiphallic pore situated laterally at base of verge.

Description. Shell large, globosely helicoid with 5 5/8-6 1/2 normally coiled whorls, rounded above and below the periphery, last descending in front; sutures weakly impressed. Apex and spire moderately to strongly elevated; colour yellowish brown with prominent sub-sutural and supra-peripheral, dark brown bands and several narrower brown spiral bands on upper part of the whorls, and one to several narrow brown spiral bands basally; latter part of body whorl with prominent dark brown suffusion behind aperture, extending onto umbilical area; parietal callus shiny, strongly suffused with



FIG. 1. *Denhamiana laetifica* sp. nov. Shell views, holotype QMMO68577. A, Dorsal; B, apertural; C, ventral. Shell diameter = 34.57 mm.

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